

# **ABUNDANCE, AGE, SEX AND SIZE STATISTICS FOR PACIFIC HERRING IN THE TOGIAK DISTRICT OF BRISTOL BAY, 2003**



By

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## TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES .....	iv
LIST OF FIGURES.....	iv
LIST OF APPENDICES .....	v
ABSTRACT .....	vi
INTRODUCTION.....	1
METHODS.....	2
Study Area.....	2
Age, Size and Sex Data.....	3
Data Collection.....	3
Sample Sizes .....	3
Age, Weight and Length Data .....	4
Commercial Harvest .....	4
Biomass Estimation.....	5
RESULTS.....	5
Commercial Harvest .....	5
Purse Seine .....	6
Gillnet.....	6
Spawn on Kelp.....	7
Biomass Estimation .....	7
DISCUSSION .....	7
LITERATURE CITED .....	10
TABLES .....	13
FIGURES .....	20
APPENDIX .....	25

## LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Historical total run biomass and commercial harvests (tons) of Pacific herring returning to the Togiak District, Bristol Bay, 1968-2003 .....	13
2. Pacific herring commercial harvest (tons) by fishing section, gear type and date, Togiak District, Bristol Bay, 2003.....	14
3. Harvest information from the herring sac roe fishery, Togiak District, 2003.....	15
4. Number of samples collected by gear type during the 2003 Togiak herring season .....	16
5. Mean length (mm) and weight (g), by age, for herring representative of the commercial harvest in the Togiak District, 2003 .....	17
6. Daily observed biomass estimates (tons) of herring by index area, Togiak District, 2003 ...	18
7. Sac roe herring industry participation, fishing effort and harvest, Togiak District, 1983-2003.....	19

## LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. Map of Southeastern Bering Sea .....	20
2. Map of Togiak Herring District, Bristol Bay .....	21
3. Age composition of the total herring harvest, Togiak District, 2003 .....	22
4. Commercial purse seine harvest distribution by fishing section, Togiak District, 2003 .....	22
5. Percent age composition of the commercial harvest by weight (top) and by numbers of fish (bottom), Togiak District, 2003 .....	23
6. Historic age composition (diameter of the circles represent percent age composition, determined by number of fish) of the purse seine harvest, gillnet harvest and total run, Togiak District, Bristol Bay.....	24

## LIST OF APPENDICES

APPENDIX A: Apportioned Harvest Information	Page
A.1. Estimated age composition of the commercial purse seine harvest, by date and fishing section, Togiak District, 2003.....	25
A.2 Estimated age composition of the commercial gillnet harvest, by date and fishing section, Togiak District, 2003.....	28
APPENDIX B: Age, Sex and Size Composition of Sampled Herring	
B.1. Age, sex and size composition of Pacific herring caught by commercial purse seine, Nunavachak Section, 27 April – 7 May 2003. ....	29
B.2. Age, sex and size composition of Pacific herring caught by commercial purse seine, Hagemeister Section, 26 April – 6 May 2003.....	31
B.3. Age, sex and size composition of Pacific herring caught by commercial purse seine, Pyrite Point Section, 26 April – 3 May 2003. ....	35
B.4. Age, sex and size composition of Pacific herring caught by commercial purse seine, Nunavachak, Hagemeister, and Pyrite Point Sections combined, 26 April – 7 May 2003....	37
B.5. Age, sex and size composition of Pacific herring caught by commercial gillnet, Kulukak Section, 25 April – 6 May 2003. ....	41
B.6. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Nunavachak Section, 25 April 2003.....	45
B.7. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Hagemeister Section, 8 May 2003.....	46
B.8. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Togiak Section, 29 April 2003. ....	47
B.9. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Nunavachak, Hagemeister and Togiak Sections, 25 April – 8 May 2003. ....	48
APPENDIX C: 2003 Togiak Herring Forecast	
C.1. 2003 Togiak herring forecast .....	50

## ABSTRACT

The Pacific herring (*Clupea pallasii*) total run in the Togiak District of Bristol Bay was monitored for abundance/biomass and sampled for age, size, and sex in 2003. Department staff estimated abundance from aerial surveys with chartered aircraft. Commercial catch samples came from purse seine and gillnet landings. During closed fishing periods, herring samples were obtained from test fish purse seine catches made by volunteers from the commercial fleet. A total of 8,461 herring were sampled from 25 April - 8 May. Scales for aging, along with sex, length, weight and sexual maturity information were collected. Herring age varied from 4 to 17 years in the samples. Samples collected with purse seine gear were predominately age-6, -7 and -10, while samples collected with gillnet gear were primarily age-7 through -10. Mean length and weight of individuals sampled from the purse seine fishery were 285 mm and 354 grams, while fish sampled from the gillnet fishery averaged 296 mm and 401 grams. Total harvest from the purse seine fishery was 15,158 tons and total harvest from the gillnet fishery was 6,505 tons. No total run biomass estimate was calculated in 2003 because of inadequate aerial survey information.

**KEY WORDS:** Pacific herring, *Clupea pallasii*, sac roe, spawning biomass, commercial herring fishery, Bristol Bay, Togiak District, age, length, weight, sex

## INTRODUCTION

Pacific herring (*Clupea pallasii*) are harvested in several spawning locations along the eastern Bering Sea coast from Norton Sound south to Port Moller. The Togiak District of Bristol Bay supports the largest discrete spawning biomass of Pacific herring in Alaskan waters. Biomass estimates based on aerial surveys have been conducted since 1978 and have ranged from 76,960 tons<sup>1</sup> (69,818 tonnes<sup>2</sup>) in 1980 to 242,297 tons (219,811 tonnes) in 1979 (Table 1). From 1993 through 2002, the total run biomass has averaged 148,420 (134,646 tonnes).

Herring spawn within the Togiak District from late April through May. After spawning, herring leave the fishing district and migrate south in a clockwise movement along the Alaska Peninsula to feeding areas near Unalaska Island. In August and September, these fish move to overwintering grounds near the Pribilof Islands (Shaboneev 1965, Rumyantsev and Darda 1970; Wespestad and Barton 1981; Funk 1990; Figure 1).

The largest fishery for herring that spawn in the Togiak District occurs during their inshore spawning period. The most valuable product from this harvest is the ripened ovaries, or egg skeins, referred to as sac roe. This product is primarily marketed in Japan. Commercial harvest of herring for sac roe was first documented in the Togiak District in 1968. Passage of the Fisheries Conservation and Management Act in 1976 and the resulting inability of Japanese fishers to harvest sac roe from U.S. waters prompted increased interest in the Togiak fishery by U.S. fishers. The twenty-year annual harvest is presently 20,470 tons (18,570 tonnes). The greatest harvest of 30,315 tons (27,502 tonnes) occurred during the 1994 season (Table 1).

Herring spawn, deposited on brown algae *Fucus spp.* (rockweed), is also harvested within the Togiak District. This wild spawn-on-kelp product is harvested either by hand or rake. The harvest, documented since 1967, has been intermittent in recent years because of low demand with no fishery occurring during the 1997, 1998, 2000 and 2001 seasons. The twenty-year annual harvest has averaged 182 tons (165 tonnes; Table 1).

During their post spawning migration, herring that spawn in Togiak District are susceptible to other fisheries. A directed food/bait fishery occurs during mid-to-late summer months in the Unalaska Island area. Catches were first documented on these feeding herring in 1929. Harvests reached a maximum of 3,006 tons (2,727 tonnes) in 1932. The fishery declined and ended completely by 1938 because of poor market demand, but was renewed in 1981. The annual harvest since 1983 has averaged 2,369 tons (2,185 tonnes; Table 1).

Incidental harvest of Togiak herring occurs as bycatch in fisheries targeting groundfish in the southeastern Bering Sea. Foreign vessels first exploited these groundfish fisheries but domestic

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<sup>1</sup> The Alaska Board of Fisheries requires that inseason catch and aerial survey biomass estimates be calculated and reported in short tons. The English short ton = 2,000 lb or 907.2 kg.

<sup>2</sup> The metric tonne = 1,000 kg or 2,205 lbs: The conversion is tonnes (t) = tons/1.1023

fishers have recently dominated. These fisheries often occur along the migratory route of feeding herring (Funk 1990; Rowell et al. 1991). The additional harvest upon a fully exploited herring population has been a concern brought before the North Pacific Management Council and the Alaska Board of Fisheries by western Alaskan fishermen.

Togiak herring have been managed as a single spawning population distinct from others in the Bering Sea. A maximum regulatory exploitation rate of 20% of the spawning biomass has been established in the Bristol Bay Herring Management Plan, 5AAC 27.865. This plan provides an allocation of 1,500 tons (1,361 tonnes) to the wild spawn-on-kelp fishery and 7% of the remaining harvest for the Dutch Harbor food/bait fishery. The rest of the harvestable surplus is reserved for the sac roe fishery: 30% for gillnet and 70% for the purse seine fleet.

Stock assessment studies of the Togiak herring population began in 1976 and have continued annually since 1978 (McBride et al. 1981; McBride and Whitmore 1981; Fried et al. 1982a, 1982b, 1983a, 1983b, and 1984; Lebida et al. 1985a, 1985b; Lebida 1987; Sandone and Brannian 1988; Lebida and Sandone 1990; Rowell 1995, 2002a, 2002b; West 2002; West et al. 2003; Schwanke 2003). An annual objective is to document the age, size and sex composition, as well as maturity of the commercial harvest, and to estimate run biomass and the spawning escapement of herring in the Togiak District. These data provide the basis for development of population and forecasting models used to determine harvest strategies.

## METHODS

### *Study Area*

The Togiak District consists of all state waters between the longitude of the tip of Cape Constantine and the longitude of the tip of Cape Newenham, a linear distance of approximately 193 km (Figure 2). Because of its large size, the Togiak Fishing District is divided into six management sections: Kulukak, Nunavachak, Togiak, Hagemeister, Pyrite Point and Cape Newenham.

A wide intertidal zone and several shallow bays characterize the shoreline. Diurnal tidal range may reach 4.6 m (Selkregg 1976). The primary marine vegetation in the Togiak District consists of ribbon kelp *Laminaria spp*, rockweed *Fucus spp*, and eelgrass *Zostera spp*. Herring have spawned throughout the fishing district, particularly in areas where eelgrass and rockweed have been present. Rockweed is the most visible species of aquatic vegetation because it grows on cobble substrate in intertidal areas and upon rocky outcroppings.



## *Age, Size and Sex Data*

### **Data Collection**

Pacific herring were collected from management sections within the fishing district during fishery openings and closures. Herring were sampled for each gear type and fishing section at the close of each commercial fishing period from tenders or individual fishing vessels. Attempts were made to collect samples from several vessels to ensure multiple schools were represented. During closed fishing periods, volunteer commercial fishers made test purse seine sets to capture herring for sampling roe content. Samples were also collected for age, sex and length information from these sets.

A scale for age determination was removed from the left side of each fish approximately 2.5 cm behind the operculum and 2.5 cm below the lateral line. If scales were absent from this preferred area, a scale was removed from the right side of the fish in the same location, or anywhere a readable scale was present. Removed scales were dipped in 10% mucilage solution, mounted sculptured side up on glass slides, and read by annuli interpretation using a microfiche reader. Scales were aged by counting the annuli formed at the end of winter prior to spawning (Shaboneev 1965). This timing was coincidental to the collection of samples in the spawning migration; thus, the outer edge of the scale was counted as an annulus.

Standard length from the tip of the snout to the hypural plate at the base of the tail was measured to the nearest millimeter. Each herring was weighed to the nearest gram.

Sex and maturity were determined for each herring by examination of the gonads, or sex products. Maturity of both male and female herring was rated by the eight-scale guideline outlined in Barton and Steinhoff (1980). These categories were combined and summarized as green, ripe or spent.

### **Sample Sizes**

The desired sample size of a multinomial population would result in an estimate that would simultaneously fall within 5% ( $\alpha = 0.05$ ) of the true population age proportions 95% of the time (Thompson 1987). A sample size of 400 herring would guarantee this level of precision for the number of age classes represented with consideration of 10 age classes (ages 3-12). Sample sizes required to represent the biomass from test purse seines were 400 fish per 3-day strata, or 134 fish per day based on the time required to collect and process the herring. Time strata for the commercial purse seine harvest were 400 herring per day, area, and gear type. Time strata for the commercial gillnet harvest were 150 herring per day, area, and gear type.

## Age, Weight and Length Data

Age composition of the commercial harvest was estimated from herring collected from the commercial and test fisheries throughout the Togiak District. The percent age composition by number, for each age class  $P_a$ , was estimated for each gear-time-area by

$$P_a = \frac{n_a}{n}, \quad (1)$$

where:

$n_a$  = the number of herring in the sample that were age  $a$  and

$n$  = the total number of herring in the sample.

The mean weight-at-age,  $\bar{W}_a$ , for herring was estimated for each gear-time-area stratum by

$$\bar{W}_a = \frac{\sum_{i=1}^{n_a} W_{ai}}{n_a}, \quad (2)$$

where:

$W_{ai}$  = the individual weight of herring in sample  $n$  that were age  $a$ .

The mean length-at-age was calculated by substituting the individual length  $L_{ai}$  of herring for the individual weight  $W_{ai}$ .

## Commercial Harvest

Fish tickets (sales receipts) were completed by processing companies and buyers for each commercial delivery of herring. Estimates of waste or discarded herring were obtained from aerial survey estimates of discarded herring or processor reports. Estimated waste was included in the fish ticket database and used in the calculation of exploitation rates.

Age composition, by weight, of the commercial harvest was estimated by

$$B_a = \left[ \frac{n_a \bar{W}_a}{\sum_{a=1}^{\max_a} (n_a \bar{W}_a)} \right] B, \quad (3)$$

where:

$B_a$  = the harvest for age  $a$ ,

$n_a$  = the number of herring in the sample that were age  $a$ ,

$\overline{W}_a$  = the mean weight for herring of age  $a$ , and

$B$  = the total estimated harvest expressed as biomass or daily biomass estimate.

Age composition of the waste, or deadloss, (i.e., herring that were caught but not sold) was represented by the age composition for the same gear type in the commercial fishery.

The number of fish for each age class,  $N_a$ , was calculated by

$$N_a = \frac{B_a}{\overline{W}_a}. \quad (4)$$

The migration of herring between management sections within the Togiak District is not well understood. Residence time of herring within the district and rate of turnover for the biomass on the grounds is unknown. Age information from the herring samples collected by nonselective gear were pooled across management sections to determine any temporal trends in age composition, which would indicate immigration of new herring or emigration of spent herring from the fishing district.

### ***Biomass Estimation***

Herring biomass for the Togiak District was estimated using aerial survey assessment procedures outlined by Lebida and Whitmore (1985). When weather permitted, aerial surveys were flown daily at low tide to estimate herring abundance. Each management section was divided into index areas to facilitate survey documentation. Aerial survey estimates for each index area were summed to provide biomass estimates for each management section by day. Biomass estimates of these management sections were then summed to provide the observed district-wide biomass for each day.

## **RESULTS**

### ***Commercial Harvest***

A commercial harvest of 21,663 tons (19,652 tonnes) occurred within the Togiak District for sac roe product (Table 1). Commercial openings were from 25 April - 7 May, and test purse seine fisheries

occurred on 5, 7 and 8 May (Table 2). Age composition of the total harvest is in Table 3 and Figure 3. Average roe percentages of all harvested herring was 9.5% (Table 2).

Biological information was collected from 8,461 herring caught by purse seine and gillnet gear in the Togiak Fishing District from 25 April - 8 May 2003 (Table 4). Regenerated or illegible scales composed 10.2% of all scale samples. The percentage of unreadable scales from commercial gillnet samples was 11.0%, followed by commercial purse seine (10.0%) and test purse seine (9.7%).

## **Purse Seine**

There were 13 commercial purse seine openings in the Togiak District from 26 April - 7 May totaling 110 hours and 10 minutes (Table 2). A total of 15,158 tons (13,751 tonnes) of herring were harvested, which included 466 tons (423 tonnes) from test fish sets that occurred during and shortly after the commercial fishery and 380 tons (345 tonnes) of estimated deadloss. Catches from Hagemeister Section accounted for 75% of the total purse seine harvest, followed in magnitude by Nunavachak (18%), Pyrite Point (6%) and Cape Newenham (1%) Sections (Table 2; Figure 4). Row percentages averaged 8.9% from the purse seine harvested herring.

Herring sampled from the purse seine fishery ranged from age-4 to age-17 (Table 5). Age groups 6, 7 and 10 were the major age classes comprising 29%, 23% and 12% of the commercial purse seine harvest by weight and 37%, 25%, and 9% by number (Table 3; Figure 5; Appendix A.1). Mean weight of herring sampled from the harvest was 354 g and mean length was 285 mm (Table 5). Mean weights by age class of herring sampled from the purse seine fishery are in Appendix B1-B.4. Based on samples from the purse seine harvest, there was no substantial temporal change in age class structure of the biomass.

Sex composition varied over time, but overall sex composition of all aged samples from the commercial purse seine fishery was 46% female (Appendix B.1 - B.4).

## **Gillnet**

Thirteen commercial gillnet openings totaling 142 hours occurred from 25 April - 6 May harvesting a total of 6,505 tons (5,902 tonnes), all of which came from Kulukak Section (Table 2). The fishery peaked on 27 April with a harvest of 1,199 tons (1,088 tonnes). Two smaller peaks occurred on 2 May and 6 May. Row percentage from these fish averaged 10.9%.

Age composition of the samples collected from the gillnet fishery ranged from age-5 to age-16 (Table 5). Age-7 herring was the most abundant age class in the harvest comprising 28% of the harvest by weight and 32% by number of fish. Herring age-9 and older composed 55% of the gillnet harvest by weight and 48% by number (Table 3; Figure 5; Appendix A.2). Contribution of herring age-6 and younger was minimal, representing 7% by weight and 10% by number. Mean weight of herring sampled from the commercial gillnet harvest was 401 g and mean length was 296

mm (Table 5). Mean weight, by age class, of herring sampled from the gillnet fishery are in Appendix B.5.

Sex composition varied over time, but overall sex composition of all aged samples from the gillnet fishery was 54% female (Appendix B.5).

### **Spawn on Kelp**

The spawn-on-kelp fishery was conducted for a three-hour period starting at 11:30 pm on 3 May and lasting till 2:30 am on 4 May. Based on the number of buyers, harvest information from the spawn on kelp fishery is confidential under Alaska Statute 16.05.815.

### ***Biomass Estimation***

Herring surveys were flown in the Togiak Fishing District from 16 April - 30 May (Table 6). Herring were first observed on 19 April when 108 tons (98 tonnes) were observed in Hagemeister Section. No fish were observed on 16 or 20 April under poor to unsatisfactory conditions. The first substantial biomass of 19,076 tons (17,292 tonnes) was documented on 25 April with the bulk of the herring observed in the Nunavachak, Ungalikthluk, Togiak and Cape Newenham Sections. A peak daily estimate of 36,487 tons (33,101 tonnes) was documented on 29 April with almost half of the fish observed in the Togiak Section. On 16 and 30 May, the last two surveys flown, approximately 5,700 tons (5,171 tonnes) and 6,800 tons (6,169 tonnes) of fish were observed, some of which may have been capelin (Table 6). No combination of the daily aerial survey estimates produced a reliable total inseason biomass estimate; therefore, no total run biomass could be calculated for 2003.

Spawn was first documented on 23 April when 0.6 linear miles were observed in Ungalikthluk and Togiak Bays, but a complete survey was not possible because of heavy fog covering most of the district. The amount of spawn observed increased daily until it peaked on 27 April when 28.3 linear miles of spawn was observed. Less than two linear miles of spawn was observed on 30 April and 1 May. A total of 107.7 linear miles of spawn was documented throughout the survey period.

## **DISCUSSION**

The 2003 fishery started on 25 April, which was the earliest starting date in the last 20 years (Table 7). The duration of the fisheries, both purse seine and gillnet, were the longest in the last 20 years. The number of processing companies was the lowest in recent history, and daily processing capacity was equivalent to the 2002 low of 1,920 tons per day (Table 7). The number of fishing vessels, based

on peak aerial counts, was the lowest in the last 20 years. All of these points played a role in the 2003 herring harvest.

The 2003 sac roe harvest was slightly above the 20-year average of 20,470 tons (18,570 tonnes) and below the 10-year average of 22,614 tons (20,515 tonnes; Table 1). The preseason forecast allowed for a harvest of 22,081 tons (20,032 tonnes; Appendix C). The 2003 harvest was 1.9% below this guideline. Weather did not have as much of a negative impact on the fishery as in 2002 when the harvest fell 19% below the guideline. Also, unlike in 2002, larger fish remained in the district throughout the fishery and there were no concerns of overexploiting newly recruited herring.

Based on the purse seine harvest, it appears the offspring of the 1997 (age-6), 1996 (age-7) and 1993 (age-10) brood years are going to dominate the biomass in the future. These three age classes comprised 71% of the purse seine harvest by number of fish and 64% by weight.

Since total run biomass could not be estimated in 2003, age composition of the purse seine harvest was the best indication of age structure of the total run, and was compared to the preseason forecast (Table 3; Appendix C). A few disparities exist between the 2003 total run forecast and what was captured in the 2003 purse seine fishery. The most notable disparity was the mean weight of the fish. The overall mean weight of individual fish was forecasted to be 291 g; however, the actual mean weight of fish from the purse seine fishery was 354 g. Additionally, actual mean weights, by age class, were higher than the forecasted weights for all age classes (Table 3; Appendix C). The differences, by individual age classes, ranged from 5 to over 20% heavier. There are many possibilities for these disparities. First, the fish may have grown more than expected. The winter of 2002/2003 was one of the warmest on record in Alaska. This could have contributed to higher growth rates. Secondly, the nature of the fishery may have influenced these results. The length of the fishery has increased dramatically the last few years (Table 7). Also, the fishermen and processors formed co-ops in 2001 and started working together to ensure quality in the harvest. These two factors allow the purse seine fishermen to inspect their catches more closely, and harvest only the most valuable fish. Larger fish tend to have a higher gonad somatic index (gonad weight / fish weight), and are more valuable. This “high grading” is a likely reason why the average weight of herring harvested in the purse seine fishery was 18% higher than forecasted. Inseason purse seine roe percentages, as observed from inseason processor reports, also reflect this change. Although the mean inseason roe percentage in the last two years has been the highest since 1988, more stringent post-season market scrutiny the last two years has caused the final roe percentage to be dramatically lower than that observed inseason (Table 7). Lastly, aging error could have occurred, but this seems unlikely because the same person aged the scales as in 2002.

Large fish size at age characterized the 2003 herring fishery. It was expected that the average fish size of the purse seine harvest would decrease with time, but this never materialized (Appendix B.4). The nearshore waters where herring spawn in the Togiak District warmed unusually fast in 2003. This, combined with the fact that the peak daily biomass of herring was relatively low (36,487 tons (33,100 tonnes)), supports the following theory. Typically, herring concentrate offshore waiting for the nearshore waters to warm. Once the water warms, they come en mass and spawn. With nearshore waters warming early in 2003, herring may have never concentrated offshore, resulting in

a steady stream of new fish entering the district once the fishery opened. This, along with the above-mentioned changes in the fishery, could have further contributed to the large size of the fish harvested.

Despite these concerns, age composition of the purse seine harvest was similar to what was forecasted to comprise the total run. Only a few disparities exist, the main one being that a higher percentage of age-6 fish were harvested and a lower percentage of age-7 fish were harvested. However, when combining the two age classes, the forecast was accurate with the purse seine harvest of 52% of age-6 and -7 herring (Table 3; Appendix C). Fewer than expected age-4 and -5 fish were found in the fishery, which may suggest weak age classes in the future, or it could simply be an artifact of run timing, fishery timing or “high grading”. Generally, younger fish spawn later than older fish. Substantial biomass of fish, and some spawn, were observed in the Togiak District well after the fishery closed (Table 6). These fish may have been younger herring that avoided the fishery in 2003.

The changes incurred by the fishery the past few years have adversely affected our sampling program and forecasting ability. It appears that the purse seine harvest is becoming less representative of the total run of herring. A couple of solutions may exist to help alleviate this problem. The first is to conduct district wide test fishing, similar to what was done in the mid 1980s to the mid 1990s. This can be done with either by volunteer fishers or department staff before, during and after the fishery. This would provide the department with representative samples of the total run. A second solution is to gather samples from the purse seine sets that were released, in conjunction with sets that were kept. Any combination of these ideas would help our efforts in collecting a representative sample of the total biomass.

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Table 1. Historical total run biomass and commercial harvests (tons) of Pacific herring returning to the Togiak District, Bristol Bay, 1968-2003.

Year	Total Run Biomass (tons) <sup>a,b</sup>	Togiak Sac Roe Harvest (tons) <sup>c</sup>	Spawn-on-Kelp		Herring Equivalent (tons) <sup>d</sup>	Dutch Harbor Food and Bait Harvest (tons) <sup>e</sup>
			Harvest (lbs) <sup>c</sup>	Harvest (tons) <sup>c</sup>		
1968		80				
1969		47	10,125	5		
1970		28	38,855	19		
1971		<sup>f</sup>	51,795	26		
1972		80	64,165	32		
1973		51	11,596	6		
1974		123	125,646	63		
1975		56	111,087	56		
1976		<sup>f</sup>	295,780	148		
1977		2,795	275,774	138		
1978	191,537	7,734	329,858	165		
1979	242,297	11,558	414,727	207		
1980	76,960	24,516	189,662	95		
1981	158,860	12,489	378,207	189		704
1982	98,022	21,821	234,924	117		3,565
1983	141,053	26,786	274,866	137		3,567
1984	113,471	19,419	406,587	203	1,552	3,578
1985	132,420	25,812	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	3,480
1986	94,390	16,276	374,142	187	1,446	2,394
1987	89,086	15,530	307,307	154	1,309	2,503
1988	134,717	14,168	489,400	245	1,782	2,004
1989	98,965	12,259	559,754	280	2,499	3,081
1990	88,105	12,230	413,844	207	1,617	820
1991	83,229	14,970	348,357	174	1,310	1,325
1992	156,955	25,808	363,600	182	1,482	1,949
1993	193,847	17,956	383,000	192	1,481	2,790
1994	185,454	30,315	308,400	154	1,134	3,349
1995	149,093 <sup>g</sup>	26,732	281,600	141	996	1,748
1996	135,585 <sup>g</sup>	24,871	455,800	228	1,899	2,239
1997	144,887	23,813	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	1,950
1998	121,000 <sup>g</sup>	22,776	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	1,994
1999	157,026	19,878	419,563	210	1,605	2,398
2000	130,904 <sup>g</sup>	20,421	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	2,014
2001	146,209	22,330	<sup>f</sup>	<sup>f</sup>	<sup>f</sup>	1,439
2002	120,196 <sup>g</sup>	17,049	67,793	34	260	2,751
1983-02 Mean <sup>h</sup>	130,830	20,470	363,601	182	1,455	2,369
1993-02 Mean <sup>i</sup>	148,420	22,614	319,359	160	1,229	2,267
2003	126,213 <sup>g</sup>	21,663	<sup>j</sup>	<sup>j</sup>	<sup>j</sup>	1,487

<sup>a</sup> Data not available prior to 1978

<sup>b</sup> Source: ADF&G (2002)

<sup>c</sup> Source : ADF&G (1988; 1968-79); Sandone and Brannian (1988; 1980-1987); fish ticket receipts, 1988-2002.

<sup>d</sup> Management plan adopted by Board of Fisheries in 1984 setting a 350,000 lb. harvest guideline, specifying 2 to 3 year rotation, and including spawn-on-kelp (S-O-K) herring equivalent in exploitation rate. Herring equivalent calculation reported in ADF&G (1997).

<sup>e</sup> Source: ADF&G (2002); catches documented since 1929. Fishery did not occur between 1946 and 1980.

<sup>f</sup> No fishery conducted

<sup>g</sup> Aerial surveys to determine abundance were hampered by poor weather conditions preventing calculation of a final seasons biomass estimate. Inseason management used preseason forecast.

<sup>h</sup> The 1983-2002 calculated mean for S-O-K fishery does not include years 1985, 1997,1998, 2000 and 2001 and the the calculated mean harvest for the Dutch Harbor food and bait fishery does not include 1979 and 1980.

<sup>i</sup> The 1993-2002 calculated mean for the S-O-K fishery does not include years 1997,1998, 2000 and 2001.

<sup>j</sup> Data confidential under Alaska Statute 16.05.815.

Table 2. Pacific herring commercial harvest (tons) by fishing section, gear type and date, Togiak District, Bristol Bay, 2003.

Date	Duration	Periods	Kulukak		Nunavachak		Togiak		Hagemeister		Pyrite Point		Newenham		Total	Roe %
	(hh:mm)		Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %	Tons	Roe %		
<u>Purse Seine</u>																
4/26	12:00	1							1,077	8.20	88	8.00			1,165	8.18
4/27	12:00	2			751	8.00			990	8.60	59	8.50			1,799	8.35
4/28	12:00	3			433	9.30			624	8.80					1,057	9.00
4/29	12:00	4			194	6.80 <sup>b</sup>			646	8.60	155	7.60			996	8.31
4/30	12:00	5			62	<sup>c</sup>			1,517	7.70	237	9.30			1,816	7.92
5/01	12:00	6			146	<sup>d</sup>			1,835	9.70 <sup>e</sup>	85	10.60			2,066	9.74
5/02	12:00	7							1,350	8.20	36	10.60			1,386	8.26
5/03	12:00	8							966	8.90	256	10.50	221	5.60	1,442	8.68
5/04	12:00	9							1,445	10.80					1,445	10.80
5/05									199	9.06 <sup>a</sup>					199	9.06
5/06	1:00	10							222	11.50					222	11.50
5/06	1:00	11							138	8.90	55	10.8			194	9.44
5/07	:10	12			1,010	8.80			225	10.01 <sup>a</sup>					1,234	9.02
5/08					138	9.00 <sup>a</sup>									138	9.00
Subtotal	110:10		0.0		2,734	8.58	0.0		11,232	8.99	971	9.43	221	5.60	15,158	8.90
<u>Gillnet</u>																
4/25	10:00	1	126	9.70											126	9.70
4/26	11:00	2	866	11.00											866	11.00
4/27	15:00	3	1,199	11.00											1,199	11.00
4/28	15:00	4	576	10.60											576	10.60
4/29	6:00	5	388	9.80											388	9.80
4/29	5:00	6	325	9.90											325	9.90
4/30	11:00	7	477	11.00											477	11.00
5/01	11:00	8	496	11.40											496	11.40
5/02	10:00	9	587	10.90											587	10.90
5/03	10:00	10	404	11.30											404	11.30
5/04	12:00	11	68	11.70											68	11.70
5/05	16:00	12	385	11.80											385	11.80
5/06	10:00	13	608	11.10											608	11.30
Subtotal	142:00		6,505	10.90											6,505	10.90
<u>Combined</u>																
4/25			126	9.70											126	9.70
4/26			866	11.00					1,077	8.20	88	8.00			2031	9.39
4/27			1,199	11.00	751	8.00			990	8.60	59	8.50			2998	9.41
4/28			576	10.60	433	9.30			624	8.80					1632	9.57
4/29			388	9.80	194	6.80 <sup>b</sup>			646	8.60	155	7.60			1384	8.77
4/30			325	9.90	62	<sup>c</sup>			1,517	7.70	237	9.30			2141	8.23
5/01			477	11.00	146	<sup>d</sup>			1,835	9.70 <sup>e</sup>	85	10.60			2543	9.41
5/02			496	11.40					1,350	8.20	36	10.60			1883	9.09
5/03			587	10.90					966	8.90	256	10.50	220.7	5.60	2029	9.32
5/04			404	11.30					1,445	10.80					1849	10.91
5/05			68	11.70					199	9.06 <sup>a</sup>					267	9.72
5/06			385	11.80					360	10.50	55	10.8			801	11.14
5/07			608	11.10	1,010	8.80			225	10.01 <sup>a</sup>					1842	9.71
5/08					138	9.00 <sup>a</sup>									138	9.00
Total			6,505	10.90	2,734	8.58	0.0		11,232	8.99	971	9.43	221	5.60	21,663	9.45

<sup>a</sup> Includes test fish harvest which is conducted during closed commercial periods

<sup>b</sup> Includes 140.5 tons documented waste.

<sup>c</sup> Includes 62 tons documented waste.

<sup>d</sup> Includes 146 tons documented waste.

<sup>e</sup> Includes 31.2 tons documented waste.

Table 3. Harvest information from the herring sac roe fishery, Togiak District, 2003.

Purse Seine					Gillnet					Total Harvest				
Age	Biomass ST	Percent by Wt	Number (x 1,000)	Percent by No.	Age	Biomass ST	Percent by Wt	Number (x 1,000)	Percent by No.	Age	Biomass ST	Percent by Wt	Number (x 1,000)	Percent by No.
1	0	0.0	0	0.0	1	0	0.0	0	0.0	1	0	0.0	0	0.0
2	0	0.0	0	0.0	2	0	0.0	0	0.0	2	0	0.0	0	0.0
3	0	0.0	0	0.0	3	0	0.0	0	0.0	3	0	0.0	0	0.0
4	6	0.0	26	0.1	4	0	0.0	0	0.0	4	6	0.0	26	0.0
5	256	1.7	996	2.5	5	8	0.1	32	0.2	5	264	1.2	1,028	1.9
6	4,417	29.1	14,786	36.8	6	477	7.3	1,442	9.8	6	4,895	22.6	16,228	29.6
7	3,482	23.0	10,029	24.9	7	1,789	27.5	4,654	31.7	7	5,272	24.3	14,683	26.7
8	704	4.6	1,806	4.5	8	644	9.9	1,545	10.5	8	1,348	6.2	3,351	6.1
9	1,246	8.2	2,767	6.9	9	845	13.0	1,774	12.1	9	2,091	9.7	4,541	8.3
10	1,820	12.0	3,746	9.3	10	1,317	20.3	2,632	17.9	10	3,137	14.5	6,378	11.6
11	971	6.4	1,883	4.7	11	530	8.1	1,016	6.9	11	1,501	6.9	2,899	5.3
12	882	5.8	1,673	4.2	12	417	6.4	768	5.2	12	1,299	6.0	2,440	4.4
13	600	4.0	1,112	2.8	13	278	4.3	492	3.3	13	878	4.1	1,604	2.9
14	349	2.3	636	1.6	14	89	1.4	160	1.1	14	438	2.0	796	1.4
15	296	2.0	512	1.3	15	67	1.0	118	0.8	15	363	1.7	630	1.1
16	118	0.8	213	0.5	16	43	0.7	72	0.5	16	161	0.7	286	0.5
17	11	0.1	22	0.1	17	0	0.0	0	0.0	17	11	0.0	22	0.0
18	0	0.0	0	0.0	18	0	0.0	0	0.0	18	0	0.0	0	0.0
19	0	0.0	0	0.0	19	0	0.0	0	0.0	19	0	0.0	0	0.0
20	0	0.0	0	0.0	20	0	0.0	0	0.0	20	0	0.0	0	0.0
Total	15,158	100.0	40,207	100.0	Total	6,505	100.0	14,703	100.0	Total	21,663	100.0	54,910	100.0

Table 4. Number of samples collected by gear type during the 2003 Togiak herring season.

Gear Type	Number of Readable Scale Samples	Number of Unreadable Scale Samples	Total	% Unreadable Scale Samples
Commercial Purse Seine	5,857	650	6,507	10.0
Commercial Gillnet	1,381	170	1,551	11.0
Test Commercial Purse Seine	364	39	403	9.7
Total	7,602	859	8,461	10.2

Table 5. Mean length (mm) and weight (g), by age, for herring representative of the commercial harvest in the Togiak District, 2003.

Commercial Purse Seine						Commercial Gillnet					
Age	Number of Samples	Mean Length (mm)	SD	Mean Weight (g)	SD	Age	Number of Samples	Mean Length (mm)	SD	Mean Weight (g)	SD
4	4	236	13.2	171	42.7	4	0	-	-	-	-
5	67	252	7.4	225	23.2	5	3	253	6.2	239	44.1
6	2,133	266	8.3	271	30.3	6	142	270	8.1	301	28.6
7	1,505	279	9.0	319	40.2	7	437	284	8.0	349	33.9
8	245	290	7.4	369	48.0	8	144	292	6.7	378	33.1
9	343	301	8.2	426	47.3	9	164	302	6.9	433	41.2
10	602	309	8.1	461	47.1	10	246	308	7.5	455	41.1
11	280	314	9.0	485	51.5	11	93	316	6.8	475	43.2
12	274	321	38.2	502	58.6	12	73	320	8.1	493	45.4
13	183	322	7.9	522	56.0	13	46	322	7.4	514	53.2
14	90	324	9.7	523	59.0	14	15	325	8.7	506	45.1
15	89	325	8.9	546	65.0	15	11	325	8.0	514	45.3
16	37	329	7.3	542	60.0	16	7	333	9.4	535	44.7
17	5	327	10.9	548	74.7	17	0	-	-	-	-
All Samples Combined	5,857	285	24.0	354	101.3		1,381	296	17.5	401	75.0

Table 6. Daily observed biomass estimates (tons) of herring by index area, Togiak District, 2003.

Date	Start Time	Survey Rating <sup>a</sup>	Miles of Spawn	Estimated Biomass by Index Area <sup>t</sup>													Daily Total
				NUS	KUK	MET	NVK	UGL	TOG	TNG	MTG	OSK	PYR	CPN	HAG	WAL	
4/16	15:15	5.0															
4/19	11:30	3.5													108		108
4/20	11:15	4.7															
4/21	01:30	4.1													110		110
4/22	10:15	4.8					8	41									49
4/23	03:15	4.8	0.6				8	696	946								1,650
4/25	13:00	3.8	1.0			391	3,178	3,340	5,634	579	1,074	54		4,541	285		19,076
4/25	19:10	3.4	6.2			246	2,215	1,214	3,340	3,098	435	181					10,729
4/26	11:45	3.4	11.1			2,330	1,815	3,419	4,213	2,212	781	193	2,735				17,697
4/27	15:45	3.6	28.3			6	1	391		250	110	21	8			32	817
4/28	09:30	2.6	15.0		1,130	991	1,277	1,016	4,349	1,830	1,971	559	75		1,858		15,055
4/28 <sup>c</sup>	20:30		24.6														
4/29	09:45	2.7	10.9		941	260	2,418	1,942	14,527	9,585	5,076	1,400			338		36,487
4/30	09:45	2.2	1.3		639	174	154	1,324	243	3,775	4,093	1,436	8,459	488			20,785
5/1	09:45	2.9	1.9	6,180	2,146	2,652	298	1,444	6,666	1,214	2,404	2,606	282		297		26,189
5/13	13:00	4.5		6	254	5	144	229									636
5/16	15:30	3.1	3.6	754	66	2,855	712	354	597	239	11				132		5,719
5/30	12:30	2.2	3.2	31	229	3,237	983	9		2,309							6,798
Total		3.6	107.7												PEAK		36,487

<sup>a</sup> 1= Excellent, 2 = Good, 3 = Fair, 4 = Poor, 5 = Unsatisfactory

<sup>b</sup> Index areas: NUS - Nushagak Peninsula; KUK - Kulukak; MET - Metervik; NVK - Nunavachak; UGL - Ungalikthluk; Togiak; TOG - Togiak; TNG - Tongue Pt; MTG - Matogak; HAG - Hagemester; OSK - Osviak; PYP - Pyrite Point; CN - Cape Newenham.

<sup>c</sup> Vessel count and spawn survey only



Table 7. Sac roe herring industry participation, fishing effort and harvest, Togiak District, 1983-2003

Year	Companies	Daily Processing Capacity <sup>a</sup>	Fishery Dates	Gillnet					Purse Seine					Total Harvest <sup>c</sup>
				Effort <sup>b</sup>	Duration (hrs.)	Harvest <sup>c</sup>	C.P.U.E.	Roe%	Effort <sup>b</sup>	Duration (hrs.)	Harvest <sup>c</sup>	C.P.U.E.	Roe%	
1983	23		5/3-5/11	250	42.0	5,344	0.5	6.9	150	14.0	21,442	10.2	9.3	26,786
1984	25		5/18-5/21	300	35.0	4,934	0.5	8.4	196	11.0	14,485	6.7	10.2	19,419
1985	23		5/23-5/25	302	11.0	4,482	1.3	7.4	155	3.0	21,330	45.9	10.0	25,812
1986	23		5/14-5/15	209	10.0	3,448	1.6	8.8	209	1.0	12,828	61.4	9.9	16,276
1987	18		4/27-5/6	148	36.0	2,685	0.5	8.6	111	5.5	12,845	21.0	8.9	15,530
1988	22		5/17	300	4.0	3,695	3.1	8.3	239	0.5	10,472	87.6	10.9	14,167
1989	19		5/9-5/14	320	5.0	2,844	1.8	7.8	310	3.0	9,415	10.1	8.5	12,259
1990	16	3,100	5/8-5/20	277	66.0	3,072	0.2	9.0	221	3.0	9,158	13.8	9.7	12,230
1991	16	3,350	5/10-5/17	170	14.0	3,182	1.3	8.5	200	3.0	11,788	19.6	10.0	14,970
1992	18	3,700	5/20-5/27	274	25.5	5,030	0.7	8.8	301	0.3	20,778	230.1	9.2	25,808
1993	12	2,500	4/27-5/9	75	144.5	3,564	0.3	10.1	140	33.8	14,392	3.0	9.6	17,956
1994	16	3,300	5/11-5/20	146	76.0	7,462	0.7	12.0	240	4.6	22,853	20.7	9.4	30,315
1995	22	4,350	5/7-5/15	250	33.5	6,995	0.8	12.0	254	12.2	19,737	6.4	10.1	26,732
1996	19	4,850	5/3-5/8	461	18.0	6,863	0.8	11.1	268	2.4	18,008	27.8	9.0	24,871
1997	18	4,200	5/2-5/6	336	24.0	5,164	0.6	11.8	231	6.4	18,649	12.6	9.4	23,813
1998	15	2,475	4/29-5/10	152	46.0	5,952	0.9	12.5	123	16.5	16,824	8.3	9.6	22,776
1999	12	2,400	5/18-5/26	171	28.0	4,858	1.0	11.5	96	4.7	15,020	33.3	9.2	19,878
2000	12	2,100	5/6-5/14	227	67.0	5,442	0.4	10.6	90	15.8	14,957	10.6	10.1	20,399
2001	11	2,255	5/6-5/13	96	84.0	6,481	0.8	10.6	64	26.0	15,849	9.5	9.2	22,330
2002	8	1,920	5/3-5/13	82	102.0	5,216	0.6	10.9	37	57.5	11,833	5.6	9.3 <sup>d</sup>	17,049
1983-02 Ave.	17	3,115		227	43.6	4,836	0.9	9.8	182	11.2	15,633	32.2	9.6	20,469
1996-02 Ave.	14	2,886		218	52.7	5,711	0.7	11.3	130	18.5	15,877	15.4	9.4	21,588
2003	7	1,920	4/25-5/7	75	142.0	6,505	0.6	10.9	35	110.2	15,158	3.9	8.9 <sup>d</sup>	21,663

<sup>a</sup> Number of tons per day based on companies registered.<sup>b</sup> Peak aerial survey count.<sup>c</sup> Harvest total includes deadloss or test fish harvest.<sup>d</sup> Values are lower than inseason assessment due to more stringent post-season market scrutiny compared with previous years.

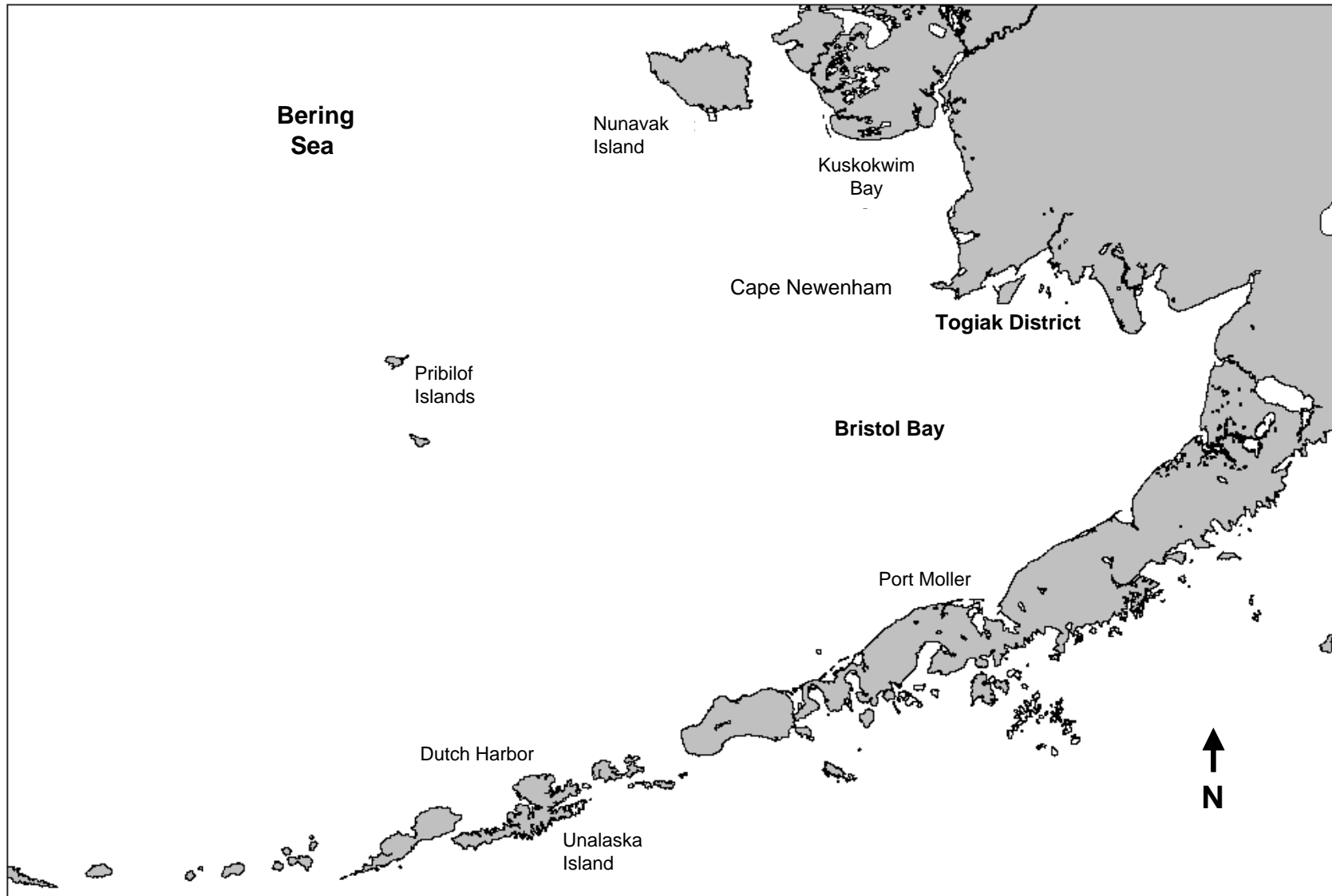


Figure 1. Map of southeastern Bering Sea.

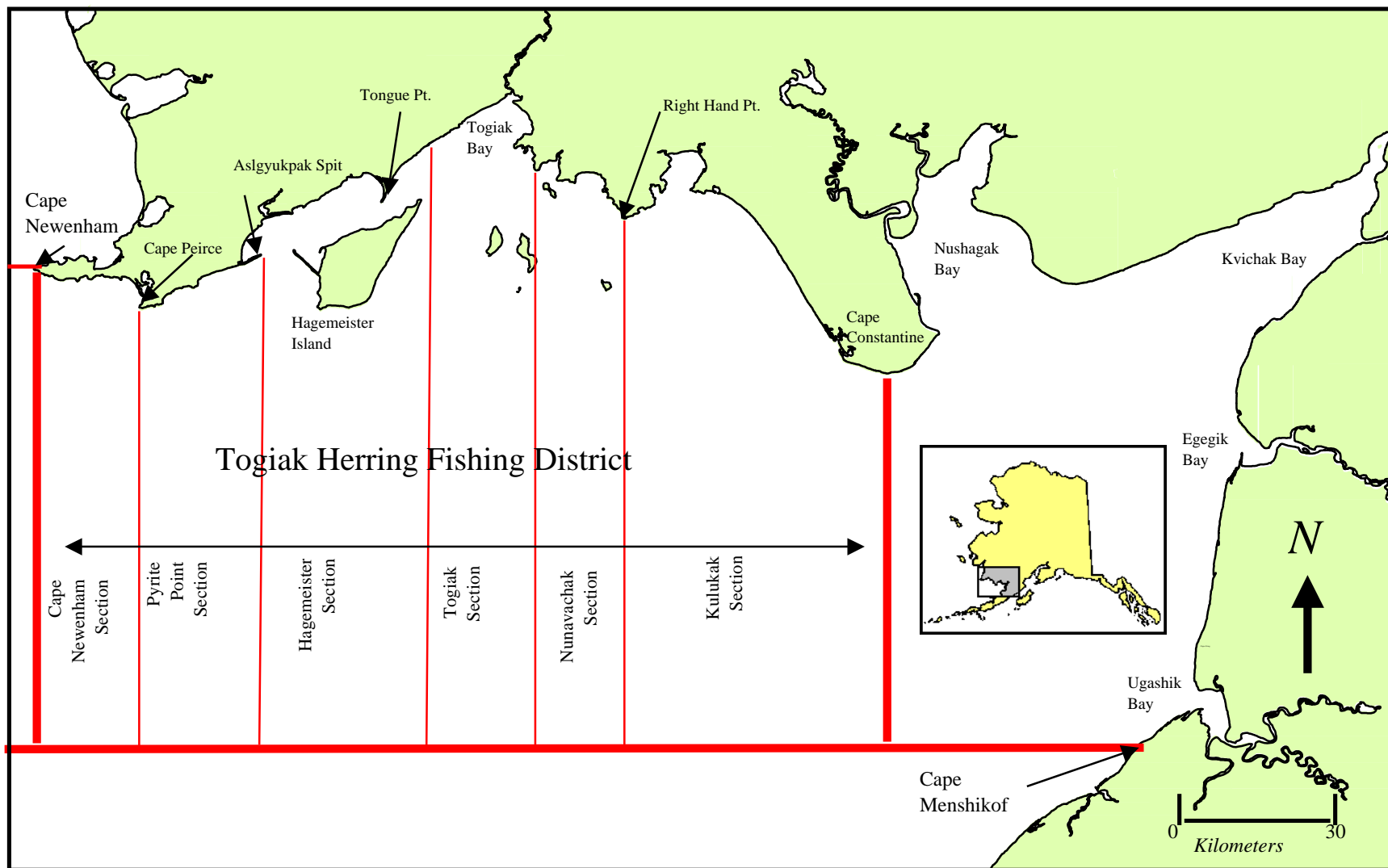


Figure 2. Map of Togiak Herring District, Bristol Bay.

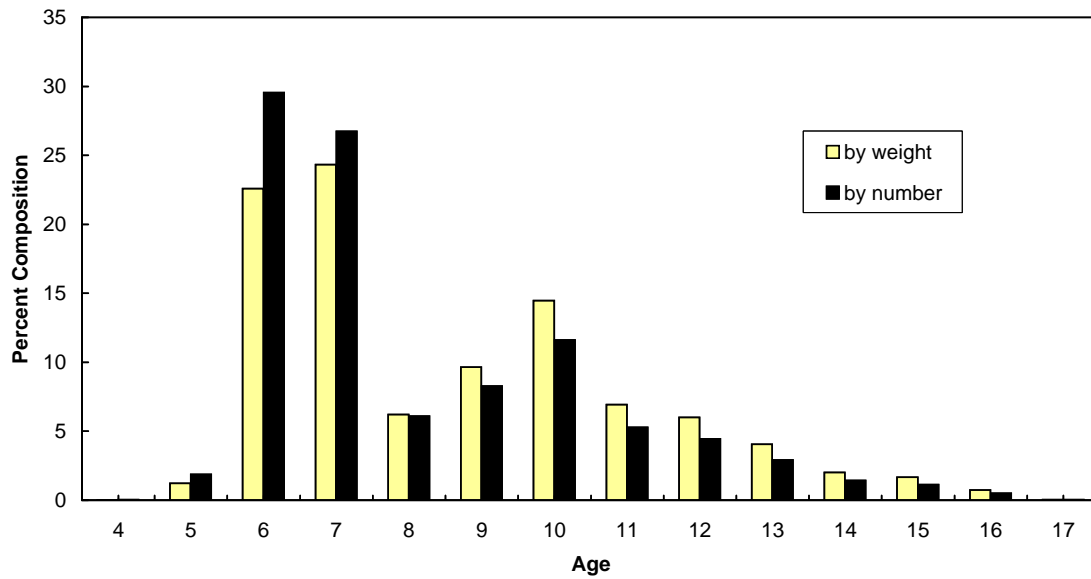


Figure 3. Age composition of the total herring harvest, Togiak District, 2003.

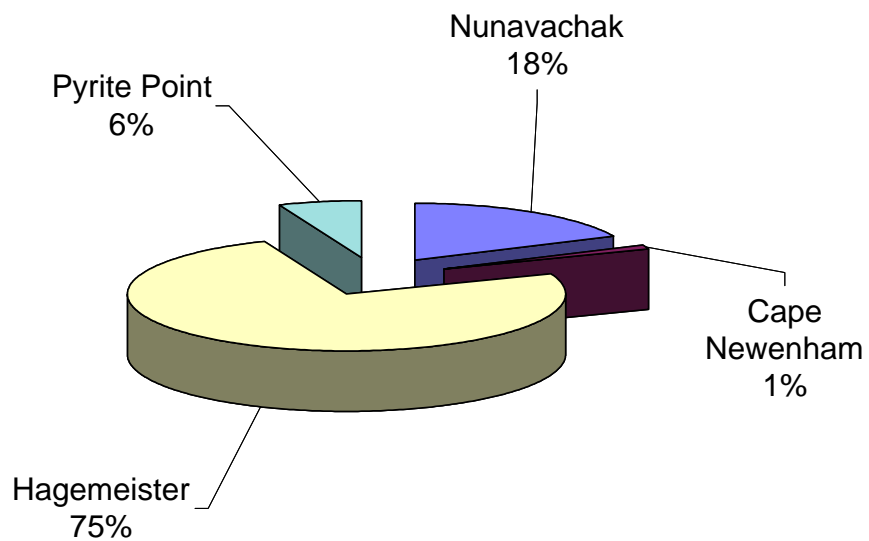


Figure 4. Commercial purse seine harvest distribution by fishing section, Togiak District, 2003.

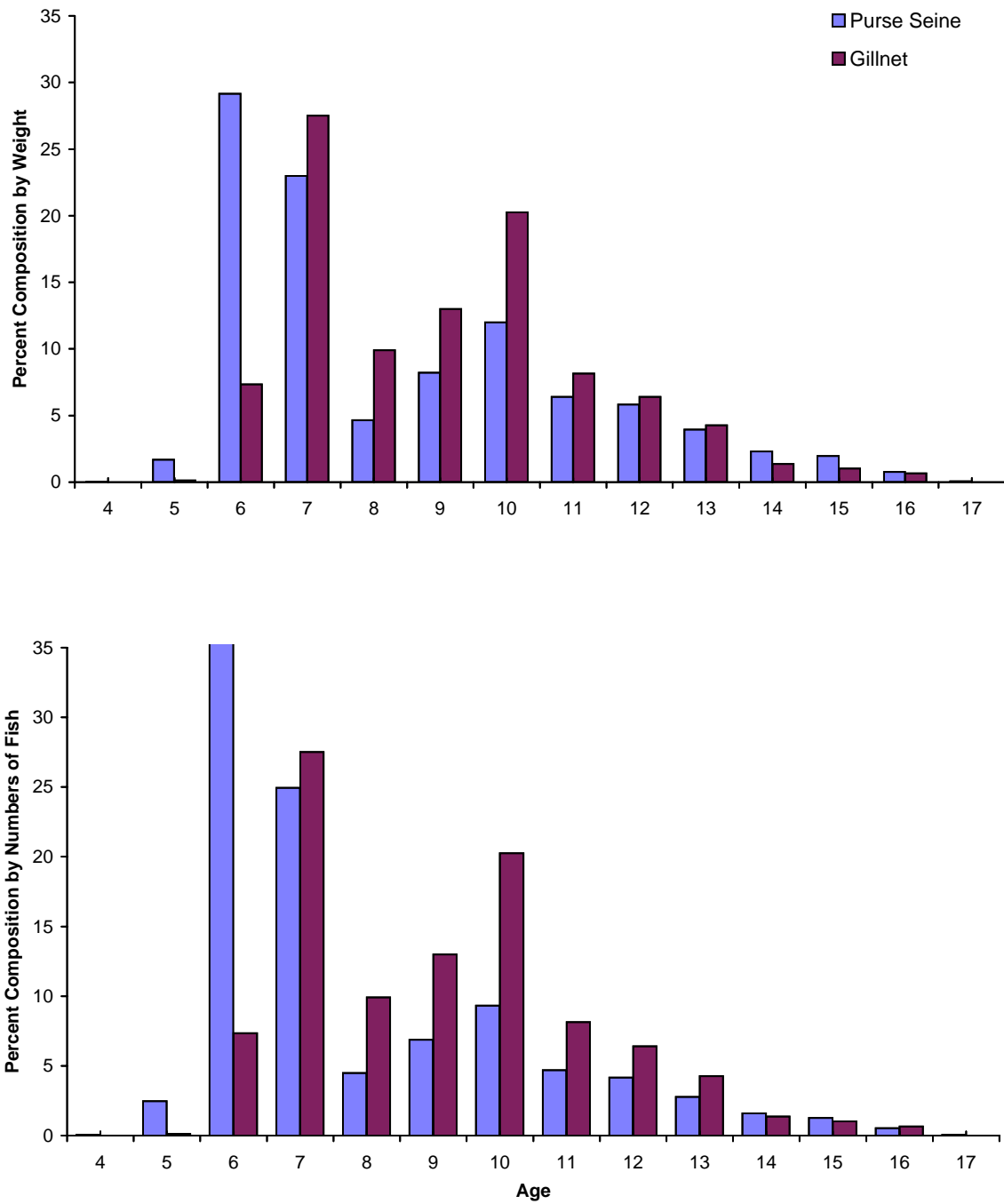


Figure 5. Percent age composition of the commercial harvest by weight (top) and by numbers of fish (bottom), Togiak District, 2003.

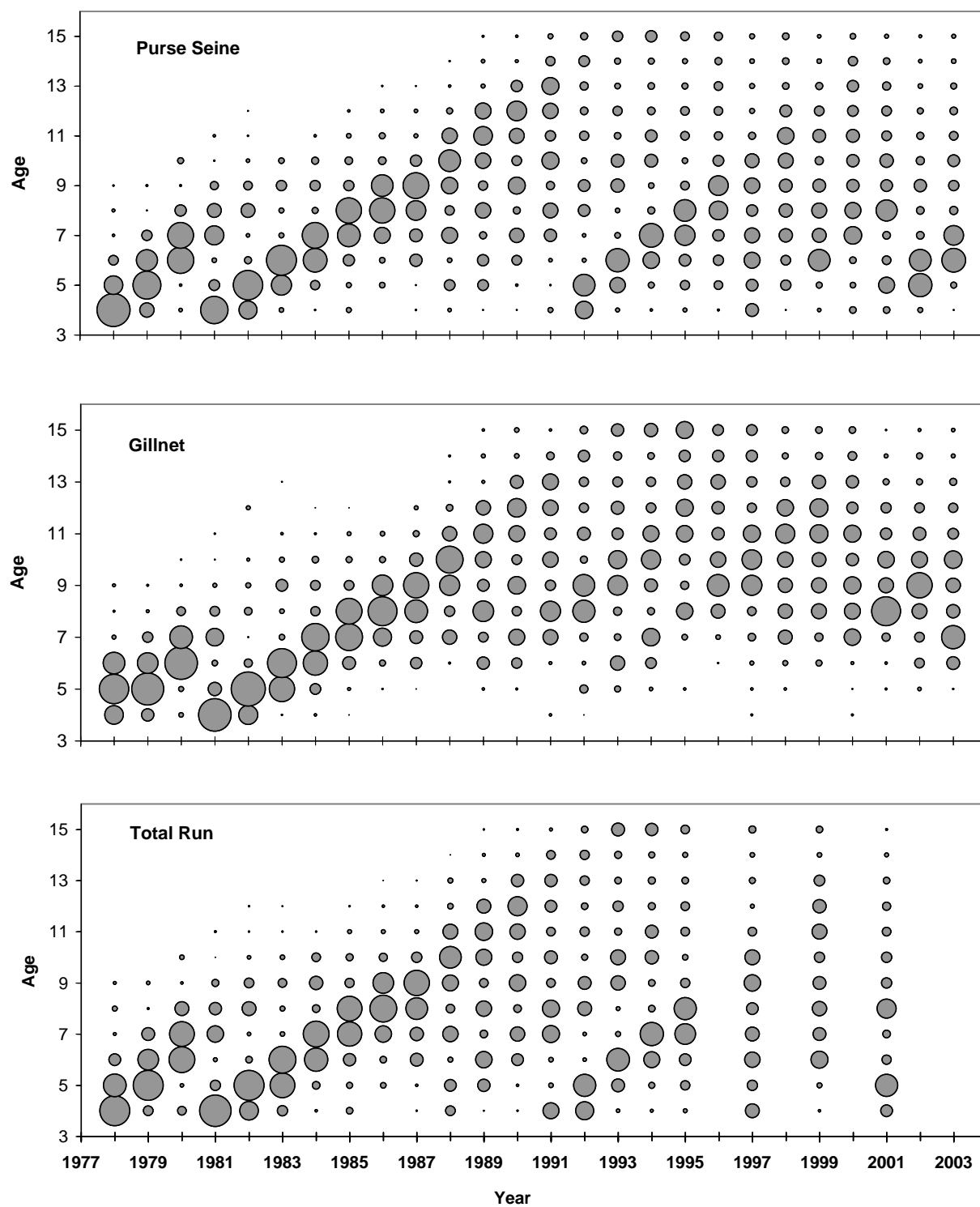


Figure 7. Historic age composition (diameter of the circles represent percent age composition, determined by number of fish) of the purse seine harvest, gillnet harvest and total run, Togiak District, Bristol Bay.

Appendix A.1. Estimated age composition of the commercial purse seine harvest, by date and fishing section,  
Togiak District, 2003.

Sample Date(s): 4/26 Section(s) Hag, Pyp Harvest biomass: 1,165 (tons)				Sample Date(s): 4/27 Section(s) Hag, Pyp, Nun Harvest biomass: 1,799 (tons)				Sample Date(s): 4/28 Section(s) Hag, Nun Harvest biomass: 1,057 (tons)				Sample Date(s): 4/29 Section(s) Hag, Nun, Pyp Harvest biomass: 996 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	4	0.7%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	94	16.8%	483	5	1	0.1%	7	5	8	1.2%	35	5	5	1.5%	37
6	103	18.4%	529	6	306	43.0%	2,110	6	307	46.2%	1,352	6	116	33.8%	855
7	25	4.5%	128	7	213	30.0%	1,469	7	179	27.0%	788	7	85	24.8%	626
8	36	6.4%	185	8	33	4.6%	228	8	20	3.0%	88	8	7	2.0%	52
9	106	18.9%	545	9	29	4.1%	200	9	32	4.8%	141	9	22	6.4%	162
10	44	7.8%	226	10	56	7.9%	386	10	51	7.7%	225	10	36	10.5%	265
11	58	10.3%	298	11	21	3.0%	145	11	23	3.5%	101	11	25	7.3%	184
12	38	6.8%	195	12	23	3.2%	159	12	23	3.5%	101	12	15	4.4%	111
13	21	3.7%	108	13	12	1.7%	83	13	14	2.1%	62	13	15	4.4%	111
14	21	3.7%	108	14	3	0.4%	21	14	3	0.5%	13	14	9	2.6%	66
15	10	1.8%	51	15	12	1.7%	83	15	3	0.5%	13	15	2	0.6%	15
16	1	0.2%	5	16	2	0.3%	14	16	1	0.2%	4	16	6	1.7%	44
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
Total	561	100.0%	2,862	Total	711	100.0%	4,902	Total	664	100.0%	2,925	Total	343	100.0%	2,527
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	22,372	10.9%	127	5	208	0.1%	2	5	1,827	0.8%	9	5	1,055	0.9%	9
6	26,931	13.1%	153	6	82,434	34.8%	626	6	83,012	38.1%	403	6	31,204	25.4%	253
7	7,748	3.8%	44	7	67,622	28.6%	514	7	56,243	25.8%	273	7	26,690	21.8%	217
8	12,491	6.1%	71	8	12,027	5.1%	91	8	7,804	3.6%	38	8	2,450	2.0%	20
9	43,554	21.2%	247	9	12,507	5.3%	95	9	13,716	6.3%	67	9	8,690	7.1%	71
10	19,723	9.6%	112	10	25,388	10.7%	193	10	22,863	10.5%	111	10	16,164	13.2%	131
11	27,226	13.2%	154	11	10,035	4.2%	76	11	10,901	5.0%	53	11	12,225	10.0%	99
12	18,691	9.1%	106	12	11,417	4.8%	87	12	10,452	4.8%	51	12	7,485	6.1%	61
13	10,674	5.2%	60	13	5,925	2.5%	45	13	7,140	3.3%	35	13	7,665	6.3%	62
14	10,523	5.1%	60	14	1,466	0.6%	11	14	1,634	0.8%	8	14	4,644	3.8%	38
15	5,194	2.5%	29	15	6,624	2.8%	50	15	1,672	0.8%	8	15	1,108	0.9%	9
16	549	0.3%	3	16	1,062	0.4%	8	16	450	0.2%	2	16	3,252	2.7%	26
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
Total	205,675	100.0%	1,165	Total	236,715	100.0%	1,799	Total	217,714	100.0%	1,057	Total	122,632	100.0%	996

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Appendix A.1. (page 2 of 3)

Sample Date(s): 4/30 Section(s) Hag, Nun, Pyp Harvest biomass: 1,816 (tons)				Sample Date(s): 5/1 Section(s) Hag, Nun, Pyp Harvest biomass: 2,066 (tons)				Sample Date(s): 5/2 Section(s) Hag, Pyp Harvest biomass: 1,386 (tons)				Sample Date(s): 5/3 Section(s) Hag, Pyp, Cpn Harvest biomass: 1,442(tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	7	0.8%	39	5	12	2.2%	118	5	6	1.6%	60	5	6	0.8%	28
6	289	34.9%	1,602	6	199	36.2%	1,870	6	190	50.4%	1,895	6	187	25.8%	859
7	232	28.0%	1,286	7	130	23.7%	1,215	7	92	24.4%	918	7	161	22.2%	740
8	39	4.7%	216	8	24	4.4%	232	8	10	2.7%	100	8	35	4.8%	161
9	50	6.0%	277	9	35	6.4%	325	9	26	6.9%	259	9	59	8.1%	271
10	82	9.9%	455	10	66	12.0%	644	10	22	5.8%	219	10	86	11.9%	395
11	42	5.1%	233	11	25	4.6%	225	11	10	2.7%	100	11	56	7.7%	257
12	34	4.1%	188	12	27	4.9%	258	12	7	1.9%	70	12	59	8.1%	271
13	23	2.8%	127	13	14	2.6%	134	13	3	0.8%	30	13	39	5.4%	179
14	16	1.9%	89	14	7	1.3%	63	14	5	1.3%	50	14	12	1.7%	55
15	12	1.4%	67	15	6	1.1%	59	15	5	1.3%	50	15	19	2.6%	87
16	2	0.2%	11	16	3	0.5%	27	16	1	0.3%	10	16	4	0.6%	18
17	0	0.0%	0	17	1	0.2%	0	17	0	0.0%	0	17	1	0.1%	5
Total	828	100.0%	4,590	Total	549	100.0%	5,170	Total	377	100.0%	3,761	Total	724	100.0%	3,327
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	1,702	0.6%	10	5	2,918	1.5%	31	5	1,308	1.0%	14	5	1,309	0.5%	7
6	79,904	26.9%	488	6	55,020	27.9%	577	6	52,060	41.3%	572	6	51,434	18.1%	261
7	74,733	25.1%	457	7	41,876	21.3%	439	7	29,900	23.7%	329	7	52,679	18.5%	267
8	14,791	5.0%	90	8	9,102	4.6%	95	8	4,200	3.3%	46	8	13,140	4.6%	67
9	21,388	7.2%	131	9	14,972	7.6%	157	9	11,622	9.2%	128	9	25,646	9.0%	130
10	38,694	13.0%	236	10	31,144	15.8%	327	10	10,384	8.2%	114	10	41,302	14.5%	209
11	20,184	6.8%	123	11	12,014	6.1%	126	11	4,980	4.0%	55	11	27,706	9.7%	140
12	17,157	5.8%	105	12	13,625	6.9%	143	12	3,605	2.9%	40	12	30,921	10.9%	157
13	12,356	4.2%	75	13	7,521	3.8%	79	13	1,599	1.3%	18	13	21,222	7.5%	107
14	8,342	2.8%	51	14	3,650	1.9%	38	14	2,905	2.3%	32	14	6,186	2.2%	31
15	6,821	2.3%	42	15	3,411	1.7%	36	15	2,815	2.2%	31	15	10,526	3.7%	53
16	1,128	0.4%	7	16	1,692	0.9%	18	16	660	0.5%	7	16	2,052	0.7%	10
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	576	0.2%	3
Total	297,200	100.0%	1,816	Total	196,944	100.0%	2,066	Total	126,038	100.0%	1,386	Total	284,699	100.0%	1,442

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Appendix A.1. (page 3 of 3)

Sample Date(s): 5/4 Section(s) Hag Harvest biomass: 1,445 (tons)				Sample Date(s): 5/5 - 5/6 Section(s) Hag, Pyp Harvest biomass: 614 (tons)				Sample Date(s): 5/7 - 5/8 Section(s) Hag, Nun Harvest biomass: 1,372 (tons)				Sample Date(s): 4/25-5/8 Section(s) Hag, Nun, Pyp, Cpn Harvest biomass: 14,751 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	1	0.3%	12	4	3	0.8%	14	4	0	0.0%	0	4	8	0.1%	26
5	5	1.4%	62	5	4	1.1%	19	5	14	2.8%	109	5	162	2.7%	996
6	94	25.8%	1,168	6	168	45.5%	786	6	225	45.2%	1,758	6	2,184	36.5%	14,786
7	96	26.4%	1,193	7	102	27.6%	477	7	152	30.5%	1,188	7	1,467	24.5%	10,029
8	31	8.5%	385	8	14	3.8%	66	8	12	2.4%	94	8	261	4.4%	1,806
9	30	8.2%	373	9	14	3.8%	66	9	19	3.8%	148	9	422	7.0%	2,767
10	42	11.5%	522	10	34	9.2%	159	10	32	6.4%	250	10	551	9.2%	3,746
11	15	4.1%	186	11	11	3.0%	51	11	13	2.6%	102	11	299	5.0%	1,883
12	17	4.7%	211	12	8	2.2%	37	12	9	1.8%	70	12	260	4.3%	1,673
13	15	4.1%	186	13	3	0.8%	14	13	10	2.0%	78	13	169	2.8%	1,112
14	8	2.2%	99	14	2	0.5%	9	14	8	1.6%	63	14	94	1.6%	636
15	5	1.4%	62	15	2	0.5%	9	15	2	0.4%	16	15	78	1.3%	512
16	4	1.1%	50	16	3	0.8%	14	16	2	0.4%	16	16	29	0.5%	213
17	1	0.3%	12	17	1	0.3%	5	17	0	0.0%	0	17	4	0.1%	22
Total	364	100.0%	4,524	Total	369	100.0%	1,727	Total	498	100.0%	3,892	Total	5,988	100.0%	40,207
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	227	0.2%	3	4	543	0.5%	3	4	0	0.0%	0	4	770	0.0%	6
5	1,280	1.2%	18	5	800	0.7%	4	5	3,063	1.9%	26	5	37,842	1.7%	256
6	25,098	23.8%	344	6	43,680	36.7%	225	6	59,694	37.5%	514	6	590,472	29.1%	4,417
7	26,880	25.5%	368	7	32,334	27.2%	167	7	47,384	29.8%	408	7	464,089	23.0%	3,482
8	8,928	8.5%	122	8	4,928	4.1%	25	8	4,353	2.7%	37	8	94,214	4.6%	704
9	9,090	8.6%	125	9	5,740	4.8%	30	9	7,819	4.9%	67	9	174,744	8.2%	1,246
10	13,062	12.4%	179	10	16,014	13.5%	83	10	14,463	9.1%	125	10	249,201	12.0%	1,820
11	4,725	4.5%	65	11	5,203	4.4%	27	11	6,097	3.8%	53	11	141,296	6.4%	971
12	5,474	5.2%	75	12	3,984	3.3%	21	12	4,476	2.8%	39	12	127,286	5.8%	882
13	4,815	4.6%	66	13	1,488	1.3%	8	13	5,127	3.2%	44	13	85,532	4.0%	600
14	2,672	2.5%	37	14	978	0.8%	5	14	4,444	2.8%	38	14	47,444	2.3%	349
15	1,610	1.5%	22	15	1,118	0.9%	6	15	1,158	0.7%	10	15	42,056	2.0%	296
16	1,296	1.2%	18	16	1,533	1.3%	8	16	1,192	0.7%	10	16	14,866	0.8%	118
17	313	0.3%	4	17	665	0.6%	3	17	0	0.0%	0	17	1,554	0.1%	11
Total	105,470	100.0%	1,445	Total	119,008	100.0%	614	Total	159,270	100.0%	1,372	Total	2,071,365	100.0%	15,158

Appendix A.2. Estimated age composition of the commercial gillnet harvest, by date and fishing section, Togiak District, 2003.

Sample Date(s): 4/25 - 4/27 Section(s): Kulukak Harvest biomass: 2,190 (tons)				Sample Dates: 4/28 - 4/30 Section(s): Kulukak Harvest biomass: 1,766 (tons)				Sample Dates: 5/1 - 5/3 Section(s): Kulukak Harvest biomass: 1,488 (tons)				Sample Dates: 5/4 - 5/6 Section(s): Kulukak Harvest biomass: 1,061 (tons)				Sample Dates: 4/25 - 5/6 Section(s): Kulukak Harvest biomass: 6,505 (tons)			
Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)	Age	No. of Samples	Percent by No.	No. of fish (x1,000)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	0	0.0%	0	5	3	0.8%	32	5	0	0.0%	0	5	0	0.0%	0	5	3	0.2%	32
6	13	3.5%	168	6	57	14.5%	607	6	49	13.2%	453	6	23	9.4%	214	6	142	10.3%	1,442
7	113	30.2%	1,460	7	140	35.7%	1,490	7	130	35.1%	1,201	7	54	22.0%	502	7	437	31.6%	4,654
8	43	11.5%	556	8	39	9.9%	415	8	39	10.5%	360	8	23	9.4%	214	8	144	10.4%	1,545
9	54	14.4%	698	9	41	10.5%	436	9	36	9.7%	333	9	33	13.5%	307	9	164	11.9%	1,774
10	71	19.0%	917	10	67	17.1%	713	10	57	15.4%	527	10	51	20.8%	474	10	246	17.8%	2,632
11	36	9.6%	465	11	16	4.1%	170	11	19	5.1%	176	11	22	9.0%	205	11	93	6.7%	1,016
12	20	5.3%	258	12	13	3.3%	138	12	22	5.9%	203	12	18	7.3%	167	12	73	5.3%	768
13	13	3.5%	168	13	13	3.3%	138	13	10	2.7%	92	13	10	4.1%	93	13	46	3.3%	492
14	5	1.3%	65	14	2	0.5%	21	14	4	1.1%	37	14	4	1.6%	37	14	15	1.1%	160
15	4	1.1%	52	15	1	0.3%	11	15	2	0.5%	18	15	4	1.6%	37	15	11	0.8%	118
16	2	0.5%	26	16	0	0.0%	0	16	2	0.5%	18	16	3	1.2%	28	16	7	0.5%	72
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	374	100.0%	4,832	Total	392	100.0%	4,173	Total	370	100.0%	3,419	Total	245	100.0%	2,279	Total	1,381	100.0%	14,703
Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)	Age	Weight	Percent by Weight	Biomass (tons)
1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0	1	0	0.0%	0
2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0	2	0	0.0%	0
3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0	3	0	0.0%	0
4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0	4	0	0.0%	0
5	0	0.0%	0	5	717	0.5%	8	5	0	0.0%	0	5	0	0.0%	0	5	717	0.1%	8
6	4,005	2.6%	57	6	16,668	11.1%	196	6	15,207	10.4%	155	6	6,814	6.6%	70	6	42,694	7.7%	477
7	39,818	25.9%	567	7	48,223	32.0%	566	7	45,186	30.9%	460	7	19,116	18.5%	196	7	152,343	27.5%	1,789
8	16,300	10.6%	232	8	14,526	9.7%	170	8	14,966	10.2%	152	8	8,700	8.4%	89	8	54,492	9.8%	644
9	23,058	15.0%	328	9	17,802	11.8%	209	9	15,590	10.7%	159	9	14,559	14.1%	149	9	71,009	12.8%	845
10	32,027	20.8%	456	10	30,208	20.1%	354	10	25,836	17.7%	263	10	23,758	23.0%	244	10	111,829	20.2%	1,317
11	16,737	10.9%	238	11	7,521	5.0%	88	11	9,374	6.4%	95	11	10,525	10.2%	108	11	44,157	8.0%	530
12	9,855	6.4%	140	12	6,411	4.3%	75	12	10,678	7.3%	109	12	9,018	8.7%	92	12	35,962	6.5%	417
13	6,431	4.2%	92	13	6,970	4.6%	82	13	5,021	3.4%	51	13	5,205	5.0%	53	13	23,627	4.3%	278
14	2,503	1.6%	36	14	981	0.7%	12	14	2,113	1.4%	22	14	1,988	1.9%	20	14	7,585	1.4%	89
15	1,997	1.3%	28	15	465	0.3%	5	15	1,066	0.7%	11	15	2,128	2.1%	22	15	5,656	1.0%	67
16	1,041	0.7%	15	16	0	0.0%	0	16	1,060	0.7%	11	16	1,646	1.6%	17	16	3,747	0.7%	43
17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0	17	0	0.0%	0
18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0	18	0	0.0%	0
Total	153,772	100.0%	2,190	Total	150,492	100.0%	1,766	Total	146,097	100.0%	1,488	Total	103,457	100.0%	1,061	Total	553,818	100.0%	6,505

Appendix B.1. Age, sex and size composition of Pacific herring caught by commercial purse seine,  
Nunavakchak Section, 27 April - 7 May 2003.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
27-Apr	6	104	90	0	194	54.2	265	30.2	194	268	7.9	194
	7	58	49	0	107	29.9	312	35.0	107	282	7.6	107
	8	4	8	0	12	3.4	353	52.7	12	289	8.3	12
	9	8	5	0	13	3.6	439	42.3	13	308	6.5	13
	10	8	12	0	20	5.6	463	51.3	20	314	8.5	20
	11	2	2	0	4	1.1	473	45.4	4	316	12.4	4
	12	1	3	0	4	1.1	503	74.2	4	322	11.2	4
	13	2	1	0	3	0.8	508	106.0	3	328	4.7	3
	14	1	0	0	1	0.3	436		1	322		1
	15											
	16											
	17											
Sample Total		188	170	0	358	100.0	307	73.7	358	279	17.0	358
28-Apr	4											
	5	2	3	0	5	1.5	222	32.1	5	256	11.5	5
	6	87	70	0	157	46.9	266	30.3	157	265	8.6	157
	7	45	48	0	93	27.8	307	34.0	92	278	7.3	93
	8	4	2	0	6	1.8	386	33.6	6	294	7.2	6
	9	9	3	0	12	3.6	413	51.8	12	301	10.5	12
	10	10	17	0	27	8.1	453	35.6	27	308	6.8	27
	11	7	5	0	12	3.6	473	45.5	12	316	6.4	12
	12	7	6	0	13	3.9	454	99.8	13	362	9.4	13
	13	5	2	0	7	2.1	484	45.3	7	322	3.5	7
	14	1	1	0	2	0.6	501	1.4	2	319	7.1	2
	15	0	1	0	1	0.3	638		1	332		1
	16											
	17											
Sample Total		177	158	0	335	100.0	321	86.2	334	281	18.9	335
30-Apr	4											
	5	1	0	0	1	0.6	235		1	262		1
	6	53	34	0	87	49.2	272	29.7	87	265	7.3	87
	7	23	27	0	50	28.2	321	33.6	50	278	7.6	50
	8	2	3	0	5	2.8	372	57.2	5	289	10.4	5
	9	4	1	0	5	2.8	406	38.1	5	298	4.6	5
	10	8	5	0	13	7.3	471	42.0	13	308	6.8	13
	11	3	1	0	4	2.3	452	64.8	4	318	2.4	4
	12	3	2	0	5	2.8	479	74.7	5	311	10.7	5
	13	2	2	0	4	2.3	484	29.3	4	317	6.6	4
	14											
	15	0	3	0	3	1.7	558	83.4	3	326	6.6	3
	16											
	17											
Sample Total		99	78	0	177	100.0	326	84.0	177	278	19.0	177

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Appendix B.1. (page 2 of 2)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
7-May	4											
	5	7	2	0	9	2.5	212	10.1	9	249	4.3	9
	6	110	73	0	183	49.9	264	27.1	183	266	7.5	183
	7	58	54	0	112	30.5	312	37.7	112	279	8.7	112
	8	4	3	0	7	1.9	359	61.0	7	290	9.5	7
	9	9	1	0	10	2.7	403	47.5	10	297	10.7	10
	10	11	10	0	21	5.7	442	48.3	21	307	9.8	21
	11	5	3	0	8	2.2	469	34.2	8	312	6.9	8
	12	1	2	0	3	0.8	514	25.1	3	320	6.7	3
	13	4	3	0	7	1.9	513	22.6	7	323	6.3	7
	14	1	3	0	4	1.1	549	25.4	4	328	6.9	4
	15	2	0	0	2	0.5	579	81.3	2	328	3.5	2
	16	0	1	0	1	0.3	612		1	342		1
	17											
Sample Total		212	155	0	367	100.0	310	81.3	367	277	18.7	367
27 April- 7 May	4											
	5	10	5	0	15	1.2	217	20.1	15	252	8.3	15
	6	354	267	0	621	50.2	266	29.3	621	266	8.0	621
	7	184	178	0	362	29.3	312	35.5	361	279	8.0	362
	8	14	16	0	30	2.4	364	51.4	30	290	8.5	30
	9	30	10	0	40	3.2	418	47.1	40	302	9.7	40
	10	37	44	0	81	6.5	456	44.5	81	309	8.4	81
	11	17	11	0	28	2.3	469	43.5	28	315	7.1	28
	12	12	13	0	25	2.0	474	85.0	25	340	123.7	25
	13	13	8	0	21	1.7	497	47.2	21	322	6.0	21
	14	3	4	0	7	0.6	519	46.6	7	325	7.2	7
	15	2	4	0	6	0.5	578	71.1	6	328	5.0	6
	16	0	1	0	1	0.1	612		1	342		1
	17											
All Samples Combined Sex Composition		676 54.6	561 45.4	0	1237	100.0	315	81.2	1236	279	26.3	1237
Unaged Sex Composition		56 43.8	72 56.3	0	128	10.3	345	85.0	128	285	19.6	128

Appendix B.2. Age, sex and size composition of Pacific herring caught by commercial purse seine,  
Hagemeister Section, 26 April - 6 May 2003.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
26-Apr	4											
	5											
	6	27	17	0	44	13.4	262	30.2	44	270	8.1	44
	7	37	31	0	68	20.7	314	49.2	68	284	9.0	68
	8	9	5	0	14	4.3	354	43.2	14	291	7.0	14
	9	16	7	0	23	7.0	408	37.9	23	303	7.1	23
	10	30	36	0	66	20.1	449	47.3	66	314	7.1	66
	11	17	13	0	30	9.1	471	54.6	30	318	9.5	30
	12	18	14	0	32	9.8	495	56.9	32	322	10.5	32
	13	11	10	0	21	6.4	502	44.9	21	324	8.4	21
	14	8	5	0	13	4.0	503	45.9	13	326	6.0	13
	15	10	3	0	13	4.0	503	56.1	13	326	8.4	13
	16	3	1	0	4	1.2	527	70.1	4	328	3.9	4
	17											
Sample Total		186	142	0	328	100.0	404	99.5	328	303	21.4	328
27-Apr	4											
	5	1	0	0	1	0.3	208		1	252		1
	6	57	55	0	112	31.7	277	29.0	112	270	7.7	112
	7	58	48	0	106	30.0	323	38.1	106	282	9.4	106
	8	15	6	0	21	5.9	371	32.3	21	292	7.1	21
	9	6	10	0	16	4.5	425	39.1	16	305	8.1	16
	10	27	9	0	36	10.2	448	47.4	36	311	7.8	36
	11	11	6	0	17	4.8	479	46.1	17	315	8.8	17
	12	12	7	0	19	5.4	495	39.4	19	321	5.6	19
	13	7	2	0	9	2.5	489	48.8	9	323	5.6	9
	14	2	0	0	2	0.6	515	7.1	2	325	11.3	2
	15	7	5	0	12	3.4	552	60.5	12	329	8.4	12
	16	1	1	0	2	0.6	531	1.4	2	332	7.8	2
	17											
Sample Total		204	149	0	353	100.0	359	93.3	353	290	21.1	353
28-Apr	4											
	5	3	0	0	3	0.9	239	14.8	3	253	7.0	3
	6	84	66	0	150	45.6	275	29.4	150	265	7.3	150
	7	45	41	0	86	26.1	322	34.7	86	278	8.5	86
	8	7	7	0	14	4.3	392	35.5	14	291	8.6	14
	9	14	6	0	20	6.1	438	40.0	20	301	5.4	20
	10	16	8	0	24	7.3	443	50.7	24	306	8.7	24
	11	5	6	0	11	3.3	475	48.1	11	311	9.3	11
	12	5	5	0	10	3.0	455	49.0	10	315	11.9	10
	13	3	4	0	7	2.1	536	22.8	7	322	5.8	7
	14	0	1	0	1	0.3	632		1	321		1
	15	2	0	0	2	0.6	517	80.6	2	325	11.3	2
	16	1	0	0	1	0.3	450		1	329		1
	17											
Sample Total		185	144	0	329	100.0	335	84.1	329	280	19.5	329

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Appendix B.2. (page 2 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
29-Apr	4											
	5	4	1	0	5	1.5	211	18.1	5	253	2.9	5
	6	51	65	0	116	33.8	269	28.7	116	267	7.5	116
	7	45	40	0	85	24.8	314	42.3	85	280	8.4	85
	8	4	3	0	7	2.0	350	47.1	7	291	10.9	7
	9	14	8	0	22	6.4	395	61.0	22	299	11.4	22
	10	24	12	0	36	10.5	449	46.8	36	310	7.3	36
	11	13	12	0	25	7.3	489	60.8	25	315	7.6	25
	12	8	7	0	15	4.4	499	67.0	15	319	9.7	15
	13	7	8	0	15	4.4	511	74.8	15	321	8.9	15
	14	5	4	0	9	2.6	516	54.7	9	323	9.8	9
	15	0	2	0	2	0.6	554	83.4	2	327	19.1	2
	16	2	4	0	6	1.7	542	58.7	6	330	9.5	6
	17											
Sample Total		177	166	0	343	100.0	358	105.2	343	288	23.0	343
30-Apr	4											
	5	0	3	0	3	0.8	264	26.4	3	265	12.2	3
	6	59	59	0	118	33.2	278	27.5	118	267	7.3	118
	7	52	51	0	103	29.0	322	35.8	103	279	7.7	103
	8	14	5	0	19	5.4	379	41.5	19	291	7.7	19
	9	19	7	0	26	7.3	423	31.4	26	299	6.4	26
	10	13	24	0	37	10.4	479	50.2	37	310	8.4	37
	11	12	5	0	17	4.8	467	37.0	17	310	9.5	17
	12	4	7	0	11	3.1	514	42.4	11	316	7.7	11
	13	6	3	0	9	2.5	570	84.5	9	328	15.9	9
	14	3	0	0	3	0.8	497	38.1	3	318	4.6	3
	15	4	3	0	7	2.0	563	59.3	7	323	6.7	7
	16	1	1	0	2	0.6	564	28.3	2	327	1.4	2
	17											
Sample Total		187	168	0	355	100.0	360	97.5	355	286	20.4	355
1-May	4											
	5	3	4	0	7	1.9	235	19.3	7	248	6.4	7
	6	77	60	0	137	36.8	279	31.8	137	262	9.4	137
	7	50	31	0	81	21.8	325	41.2	81	277	10.6	81
	8	10	7	0	17	4.6	379	43.3	17	288	6.1	17
	9	8	10	0	18	4.8	445	55.1	18	300	7.4	18
	10	22	26	0	48	12.9	458	43.0	48	305	7.6	48
	11	9	12	0	21	5.6	504	58.3	21	311	9.5	21
	12	7	13	0	20	5.4	499	35.6	20	316	6.3	20
	13	5	6	0	11	3.0	528	43.4	11	320	7.4	11
	14	3	2	0	5	1.3	533	35.3	5	323	9.3	5
	15	3	2	0	5	1.3	539	37.2	5	318	6.5	5
	16	0	1	0	1	0.3	548		1	334		1
	17	0	1	0	1	0.3	505		1	322		1
Sample Total		197	175	0	372	100.0	364	100.7	372	283	23.5	372

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Appendix B.2. (page 3 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
2-May	4											
	5	4	2	0	6	1.6	218	24.4	6	244	5.0	6
	6	96	94	0	190	50.4	274	31.4	190	259	8.0	190
	7	47	45	0	92	24.4	325	44.3	92	272	9.9	92
	8	6	4	0	10	2.7	420	44.6	10	290	7.2	10
	9	14	12	0	26	6.9	447	43.1	26	296	5.2	26
	10	10	12	0	22	5.8	472	42.9	22	301	6.6	22
	11	4	6	0	10	2.7	498	45.7	10	308	7.5	10
	12	5	2	0	7	1.9	515	48.7	7	311	10.9	7
	13	1	2	0	3	0.8	533	73.7	3	314	5.5	3
	14	2	3	0	5	1.3	581	53.3	5	323	4.2	5
	15	1	4	0	5	1.3	563	80.7	5	325	14.3	5
	16	0	1	0	1	0.3	660		1	327		1
	17											
Sample Total		190	187	0	377	100.0	334	95.6	377	272	20.5	377
3-May	4											
	5	3	2	0	5	1.3	214	10.1	5	251	3.0	5
	6	67	71	0	138	36.9	274	28.7	138	264	7.7	138
	7	53	56	0	109	29.1	323	44.5	109	277	8.8	109
	8	10	8	0	18	4.8	373	58.2	18	289	7.7	18
	9	19	7	0	26	7.0	433	46.6	26	299	7.5	26
	10	12	11	0	23	6.1	470	51.5	23	306	6.8	23
	11	6	8	0	14	3.7	494	39.0	14	312	6.4	14
	12	10	6	0	16	4.3	527	51.9	16	317	9.4	16
	13	5	7	0	12	3.2	549	33.7	12	322	7.6	12
	14	1	4	0	5	1.3	533	27.0	5	322	4.3	5
	15	3	2	0	5	1.3	554	52.6	5	323	6.1	5
	16	2	0	0	2	0.5	519	24.0	2	324	2.1	2
	17	0	1	0	1	0.3	576		1	332		1
Sample Total		191	183	0	374	100.0	353	101.3	374	282	21.2	374
4-May	4	1	0	0	1	0.3	141		1	227		1
	5	4	1	0	5	1.4	239	17.6	5	256	3.8	5
	6	48	46	0	94	25.8	265	29.2	94	267	7.5	94
	7	47	49	0	96	26.4	311	38.4	96	280	8.4	96
	8	23	8	0	31	8.5	353	45.6	31	288	5.5	31
	9	12	18	0	30	8.2	426	44.2	30	303	5.9	30
	10	18	24	0	42	11.5	459	35.5	42	311	6.6	42
	11	7	8	0	15	4.1	490	39.9	15	315	7.6	15
	12	7	10	0	17	4.7	520	51.3	17	322	6.8	17
	13	8	7	0	15	4.1	517	57.1	15	321	10.2	15
	14	1	7	0	8	2.2	542	57.8	8	334	10.4	8
	15	3	2	0	5	1.4	501	99.0	5	322	8.0	5
	16	4	0	0	4	1.1	505	68.9	4	324	4.3	4
	17	1	0	0	1	0.3	478		1	313		1
Sample Total		184	180	0	364	100.0	364	102.6	364	289	22.3	364

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## Appendix B.2. (page 4 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
6-May	4	1	2	0	3	0.8	181	46.4	3	239	14.3	3
	5	3	1	0	4	1.1	200	26.3	4	246	3.9	4
	6	93	75	0	168	45.5	260	30.5	168	266	8.2	168
	7	51	51	0	102	27.6	317	37.7	102	281	7.4	102
	8	7	7	0	14	3.8	352	47.3	14	291	6.2	14
	9	9	5	0	14	3.8	410	44.5	14	303	7.8	14
	10	19	15	0	34	9.2	471	39.2	34	311	6.6	34
	11	9	2	0	11	3.0	473	54.3	11	316	8.8	11
	12	5	3	0	8	2.2	498	66.6	8	321	11.5	8
	13	2	1	0	3	0.8	496	120.5	3	318	8.5	3
	14	2	0	0	2	0.5	489	108.9	2	331	3.5	2
	15	1	1	0	2	0.5	559	7.1	2	331	0.0	2
	16	3	0	0	3	0.8	511	31.3	3	322	5.1	3
	17	0	1	0	1	0.3	665		1	342		1
Sample Total		205	164	0	369	100.0	322	92.3	369	281	20.5	369
26 April- 6 May	4	2	2	0	4	0.1	171	42.7	4	236	13.2	4
	5	25	14	0	39	1.1	225	24.9	39	251	7.5	39
	6	659	608	0	1,267	35.5	272	30.4	1,267	265	9	1,267
	7	485	443	0	928	26.0	320	40.6	928	279	9.3	928
	8	105	60	0	165	4.6	370	46.7	165	290	7.0	165
	9	131	90	0	221	6.2	426	46.5	221	301	7.5	221
	10	191	177	0	368	10.3	458	46.2	368	309	8.1	368
	11	93	78	0	171	4.8	484	50.7	171	314	8.9	171
	12	81	74	0	155	4.3	502	52.6	155	319	9.2	155
	13	55	50	0	105	2.9	521	59.5	105	322	9.1	105
	14	27	26	0	53	1.5	526	53.5	53	325	8.3	53
	15	34	24	0	58	1.6	537	63.7	58	325	8.8	58
	16	17	9	0	26	0.7	531	56.6	26	327	6.1	26
	17	1	3	0	4	0.1	556	83.6	4	327	12.5	4
All Samples Combined Sex Composition		1,906 53.5	1,658 46.5	0	3,564	100.0	355	99.6	3,564	285	22.7	3,564
Unaged Sex Composition		179 48.5	190 51.5	0	369	10.4	385	102.6	369	293	23.0	369



Appendix B.3. Age, sex and size composition of Pacific herring caught by commercial purse seine, Pyrite Point Section, 26 April - 3 May 2003.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
26-Apr	4											
	5	1	3	0	4	1.7	238	22.8	4	260	3.3	4
	6	31	19	0	50	21.5	261	29.3	50	268	7.4	50
	7	18	17	0	35	15.0	302	38.6	35	279	7.3	35
	8	5	6	0	11	4.7	338	51.0	11	288	7.8	11
	9	9	4	0	13	5.6	416	43.7	13	307	8.1	13
	10	26	14	0	40	17.2	447	45.8	40	311	8.7	40
	11	8	6	0	14	6.0	466	63.6	14	317	15.3	14
	12	15	11	0	26	11.2	488	55.6	26	322	7.9	26
	13	6	11	0	17	7.3	516	38.1	17	322	5.7	17
	14	7	1	0	8	3.4	498	21.5	8	322	5.5	8
	15	2	6	0	8	3.4	546	37.6	8	330	5.3	8
	16	3	3	0	6	2.6	564	68.1	6	336	8.7	6
	17	1	0	0	1	0.4	515		1	325		1
Sample Total		132	101	0	233	100.0	394	111.1	233	299	24.5	233
30-Apr	4											
	5	3	0	0	3	1.0	225	25.3	3	250	6.1	3
	6	40	44	0	84	28.4	279	28.7	84	268	6.8	84
	7	38	41	0	79	26.7	323	43.1	79	279	10.3	79
	8	3	12	0	15	5.1	382	44.2	15	291	6.3	15
	9	10	9	0	19	6.4	440	43.5	19	303	8.9	19
	10	19	13	0	32	10.8	464	59.5	32	309	8.0	32
	11	11	10	0	21	7.1	497	59.9	21	317	10.5	21
	12	11	7	0	18	6.1	506	54.2	18	317	8.7	18
	13	3	7	0	10	3.4	529	48.8	10	319	6.2	10
	14	7	6	0	13	4.4	527	60.0	13	325	7.5	13
	15	0	2	0	2	0.7	603	70.0	2	327	19.8	2
	16											
	17											
Sample Total		145	151	0	296	100.0	376	104.7	296	289	22.3	296
1-May	4											
	5	5	0	0	5	2.8	238	15.7	5	254	4.6	5
	6	34	28	0	62	35.0	282	31.5	62	267	8.5	62
	7	26	23	0	49	27.7	333	46.4	49	280	9.4	49
	8	3	4	0	7	4.0	360	53.8	7	285	9.6	7
	9	7	10	0	17	9.6	431	56.0	17	301	10.1	17
	10	8	10	0	18	10.2	467	31.6	18	307	6.0	18
	11	3	1	0	4	2.3	525	33.8	4	319	5.4	4
	12	3	4	0	7	4.0	510	50.3	7	313	7.9	7
	13	1	2	0	3	1.7	551	32.5	3	322	8.1	3
	14	1	1	0	2	1.1	612	36.8	2	333	0.7	2
	15	0	1	0	1	0.6	608		1	329		1
	16	0	2	0	2	1.1	621	6.4	2	326	5.7	2
	17											
Sample Total		91	86	0	177	100.0	360	99.7	177	284	20.6	177

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## Appendix B.3. (page 2 of 2)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
3-May	4											
	5	1	0	0	1	0.3	239		1	254		1
	6	27	22	0	49	14.0	278	31.2	49	267	7.8	49
	7	29	23	0	52	14.9	336	41.9	52	281	8.7	52
	8	13	4	0	17	4.9	378	51.5	17	289	7.8	17
	9	17	16	0	33	9.4	436	50.9	33	299	8.3	33
	10	32	31	0	63	18.0	484	47.2	63	309	7.8	63
	11	28	14	0	42	12.0	495	48.6	42	314	6.6	42
	12	24	19	0	43	12.3	523	60.1	43	317	8.2	43
	13	13	14	0	27	7.7	542	56.9	27	322	6.2	27
	14	2	5	0	7	2.0	503	112.0	7	317	22.0	7
	15	7	7	0	14	4.0	554	77.9	14	323	10.5	14
	16	0	2	0	2	0.6	507	11.3	2	324	3.5	2
	17											
Sample Total		193	157	0	350	100.0	437	105.5	350	300	20.8	350
26 April- 3 May	4											
	5	10	3	0	13	1.2	235	18.8	13	255	5.5	13
	6	132	113	0	245	23.2	276	30.9	245	267	7.5	245
	7	111	104	0	215	20.4	325	44.1	215	280	9.3	215
	8	24	26	0	50	4.7	368	51.1	50	289	7.7	50
	9	43	39	0	82	7.8	433	49.1	82	302	9.1	82
	10	85	68	0	153	14.5	468	50.1	153	309	7.9	153
	11	50	31	0	81	7.7	492	54.7	81	315	9.6	81
	12	53	41	0	94	8.9	509	58.1	94	318	8.4	94
	13	23	34	0	57	5.4	532	49.9	57	321	6.1	57
	14	17	13	0	30	2.8	519	71.1	30	323	12.2	30
	15	9	16	0	25	2.4	557	65.0	25	326	9.8	25
	16	3	7	0	10	0.9	564	63.4	10	331	8.9	10
	17	1	0	0	1	0.1	515		1	325		1
All Samples Combined Sex Composition		561 53.1	495 46.9	0	1,056	100.0	397	109.5	1,056	294	22.9	1,056
Unaged Sex Composition		71 46.4	82 53.6	0	153	14.5	429	101.3	153	302	21.5	153

Appendix B.4. Age, sex and size composition of Pacific herring caught by commercial purse seine, Hagemeister, Nunavachak and Pyrite Point Sections, 26 April - 7 May 2003.

Sample Dates	Age	Sex (number)			Total	Percent of Total	Weight			Length		
		Male	Female	Unknown			Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
26-Apr	4											
	5	1	3	0	4	0.7	238	22.8	4	260	3.3	4
	6	58	36	0	94	16.8	261	29.6	94	269	7.8	94
	7	55	48	0	103	18.4	310	46.0	103	282	8.7	103
	8	14	11	0	25	4.5	347	46.4	25	289	7.3	25
	9	25	11	0	36	6.4	411	39.7	36	304	7.6	36
	10	56	50	0	106	18.9	448	46.5	106	313	7.8	106
	11	25	19	0	44	7.8	470	56.9	44	318	11.4	44
	12	33	25	0	58	10.3	492	55.9	58	322	9.3	58
	13	17	21	0	38	6.8	508	42.0	38	323	7.3	38
	14	15	6	0	21	3.7	501	37.9	21	324	6.0	21
	15	12	9	0	21	3.7	519	53.4	21	327	7.5	21
	16	6	4	0	10	1.8	549	67.6	10	333	7.8	10
	17	1	0	0	1	0.2	515		1	325		1
Sample Total		318	243	0	561	100.0	400	104.5	561	301	22.8	561
27-Apr	4											
	5	1	0	0	1	0.1	208		1	252		1
	6	161	145	0	306	43.0	269	30.3	306	269	7.9	306
	7	116	97	0	213	30.0	318	36.9	213	282	8.5	213
	8	19	14	0	33	4.6	365	41.1	33	291	7.6	33
	9	14	15	0	29	4.1	432	40.4	29	306	7.5	29
	10	35	21	0	56	7.9	453	48.9	56	312	8.1	56
	11	13	8	0	21	3.0	478	44.9	21	315	9.2	21
	12	13	10	0	23	3.2	496	45.1	23	321	6.5	23
	13	9	3	0	12	1.7	494	62.0	12	324	5.6	12
	14	3	0	0	3	0.4	489	45.9	3	324	8.2	3
	15	7	5	0	12	1.7	552	60.5	12	329	8.4	12
	16	1	1	0	2	0.3	531	1.4	2	332	7.8	2
	17											
Sample Total		392	319	0	711	100.0	333	88.0	711	284	19.9	711
28-Apr	4											
	5	5	3	0	8	1.2	229	27.0	8	255	9.6	8
	6	171	136	0	307	46.2	271	30.2	307	265	8.0	307
	7	90	89	0	179	27.0	314	35.0	178	278	7.9	179
	8	11	9	0	20	3.0	390	34.2	20	292	8.1	20
	9	23	9	0	32	4.8	428	45.6	32	301	7.6	32
	10	26	25	0	51	7.7	449	43.2	51	307	7.7	51
	11	12	11	0	23	3.5	474	45.7	23	314	8.2	23
	12	12	11	0	23	3.5	454	80.1	23	342	9.0	23
	13	8	6	0	14	2.1	510	43.8	14	322	4.6	14
	14	1	2	0	3	0.5	545	75.6	3	320	5.1	3
	15	2	1	0	3	0.5	557	90.2	3	327	9.0	3
	16	1	0	0	1	0.2	450		1	329		1
	17											
Sample Total		362	302	0	664	100.0	328	85.4	663	280	20.9	664

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Appendix B.4. (page 2 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
29-Apr	4											
	5	4	1	0	5	1.5	211	18.1	5	253	2.9	5
	6	51	65	0	116	33.8	269	28.7	116	267	7.5	116
	7	45	40	0	85	24.8	314	42.3	85	280	8.4	85
	8	4	3	0	7	2.0	350	47.1	7	291	10.9	7
	9	14	8	0	22	6.4	395	61.0	22	299	11.4	22
	10	24	12	0	36	10.5	449	46.8	36	310	7.3	36
	11	13	12	0	25	7.3	489	60.8	25	315	7.6	25
	12	8	7	0	15	4.4	499	67.0	15	319	9.7	15
	13	7	8	0	15	4.4	511	74.8	15	321	8.9	15
	14	5	4	0	9	2.6	516	54.7	9	323	9.8	9
	15	0	2	0	2	0.6	554	83.4	2	327	19.1	2
	16	2	4	0	6	1.7	542	58.7	6	330	9.5	6
	17											
Sample Total		177	166	0	343	100.0	358	105.2	343	288	23.0	343
30-Apr	4											
	5	4	3	0	7	0.8	243	28.9	7	258	10.9	7
	6	152	137	0	289	34.9	277	28.6	289	267	7.2	289
	7	113	119	0	232	28.0	322	37.9	232	279	8.6	232
	8	19	20	0	39	4.7	379	43.5	39	291	7.3	39
	9	33	17	0	50	6.0	428	37.8	50	300	7.4	50
	10	40	42	0	82	9.9	472	52.7	82	309	7.9	82
	11	26	16	0	42	5.1	481	53.7	42	314	10.2	42
	12	18	16	0	34	4.1	505	53.5	34	316	8.6	34
	13	11	12	0	23	2.8	537	68.4	23	322	11.7	23
	14	10	6	0	16	1.9	522	56.7	16	324	7.4	16
	15	4	8	0	12	1.4	569	62.3	12	325	8.4	12
	16	1	1	0	2	0.2	564	28.3	2	327	1.4	2
	17											
Sample Total		431	397	0	828	100.0	359	99.1	828	285	21.2	828
1-May	4											
	5	8	4	0	12	2.2	236	17.2	12	251	6.3	12
	6	111	88	0	199	36.2	280	31.7	199	263	9.4	199
	7	76	54	0	130	23.7	328	43.2	130	278	10.2	130
	8	13	11	0	24	4.4	374	46.2	24	287	7.3	24
	9	15	20	0	35	6.4	438	55.2	35	300	8.7	35
	10	30	36	0	66	12.0	460	40.1	66	306	7.2	66
	11	12	13	0	25	4.6	507	55.1	25	312	9.3	25
	12	10	17	0	27	4.9	502	39.2	27	316	6.7	27
	13	6	8	0	14	2.6	533	41.2	14	321	7.3	14
	14	4	3	0	7	1.3	556	50.3	7	326	8.8	7
	15	3	3	0	6	1.1	550	43.7	6	320	7.3	6
	16	0	3	0	3	0.5	596	42.1	3	329	6.1	3
	17	0	1	0	1	0.2	505		1	322		1
Sample Total		288	261	0	549	100.0	363	100.3	549	283	22.6	549

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Appendix B.4. (page 3 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
2-May	4											
	5	4	2	0	6	1.6	218	24.4	6	244	5.0	6
	6	96	94	0	190	50.4	274	31.4	190	259	8.0	190
	7	47	45	0	92	24.4	325	44.3	92	272	9.9	92
	8	6	4	0	10	2.7	420	44.6	10	290	7.2	10
	9	14	12	0	26	6.9	447	43.1	26	296	5.2	26
	10	10	12	0	22	5.8	472	42.9	22	301	6.6	22
	11	4	6	0	10	2.7	498	45.7	10	308	7.5	10
	12	5	2	0	7	1.9	515	48.7	7	311	10.9	7
	13	1	2	0	3	0.8	533	73.7	3	314	5.5	3
	14	2	3	0	5	1.3	581	53.3	5	323	4.2	5
	15	1	4	0	5	1.3	563	80.7	5	325	14.3	5
	16	0	1	0	1	0.3	660		1	327		1
	17											
Sample Total		190	187	0	377	100.0	334	95.6	377	272	20.5	377
3-May	4											
	5	4	2	0	6	0.8	218	13.6	6	252	2.9	6
	6	94	93	0	187	25.8	275	29.4	187	265	7.8	187
	7	82	79	0	161	22.2	327	44.0	161	279	8.9	161
	8	23	12	0	35	4.8	375	54.3	35	289	7.6	35
	9	36	23	0	59	8.1	435	48.7	59	299	7.9	59
	10	44	42	0	86	11.9	480	48.5	86	308	7.7	86
	11	34	22	0	56	7.7	495	46.1	56	313	6.5	56
	12	34	25	0	59	8.1	524	57.6	59	317	8.5	59
	13	18	21	0	39	5.4	544	50.5	39	322	6.6	39
	14	3	9	0	12	1.7	515	85.7	12	319	16.7	12
	15	10	9	0	19	2.6	554	70.7	19	323	9.4	19
	16	2	2	0	4	0.6	513	16.8	4	324	2.4	4
	17	0	1	0	1	0.1	576		1	332		1
Sample Total		384	340	0	724	100.0	393	111.6	724	291	22.9	724
4-May	4	1	0	0	1	0.3	141		1	227		1
	5	4	1	0	5	1.4	239	17.6	5	256	3.8	5
	6	48	46	0	94	25.8	265	29.2	94	267	7.5	94
	7	47	49	0	96	26.4	311	38.4	96	280	8.4	96
	8	23	8	0	31	8.5	353	45.6	31	288	5.5	31
	9	12	18	0	30	8.2	426	44.2	30	303	5.9	30
	10	18	24	0	42	11.5	459	35.5	42	311	6.6	42
	11	7	8	0	15	4.1	490	39.9	15	315	7.6	15
	12	7	10	0	17	4.7	520	51.3	17	322	6.8	17
	13	8	7	0	15	4.1	517	57.1	15	321	10.2	15
	14	1	7	0	8	2.2	542	57.8	8	334	10.4	8
	15	3	2	0	5	1.4	501	99.0	5	322	8.0	5
	16	4	0	0	4	1.1	505	68.9	4	324	4.3	4
	17	1	0	0	1	0.3	478		1	313		1
Sample Total		184	180	0	364	100.0	364	102.6	364	289	22.3	364

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## Appendix B.4. (page 4 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
6-May	4	1	2	0	3	0.8	181	46.4	3	239	14.3	3
	5	3	1	0	4	1.1	200	26.3	4	246	3.9	4
	6	93	75	0	168	45.5	260	30.5	168	266	8.2	168
	7	51	51	0	102	27.6	317	37.7	102	281	7.4	102
	8	7	7	0	14	3.8	352	47.3	14	291	6.2	14
	9	9	5	0	14	3.8	410	44.5	14	303	7.8	14
	10	19	15	0	34	9.2	471	39.2	34	311	6.6	34
	11	9	2	0	11	3.0	473	54.3	11	316	8.8	11
	12	5	3	0	8	2.2	498	66.6	8	321	11.5	8
	13	2	1	0	3	0.8	496	120.5	3	318	8.5	3
	14	2	0	0	2	0.5	489	108.9	2	331	3.5	2
	15	1	1	0	2	0.5	559	7.1	2	331	0.0	2
	16	3	0	0	3	0.8	511	31.3	3	322	5.1	3
	17	0	1	0	1	0.3	665		1	342		1
Sample Total		205	164	0	369	100.0	322	92.3	369	281	20.5	369
7-May	4											
	5	7	2	0	9	2.5	212	10.1	9	249	4.3	9
	6	110	73	0	183	49.9	264	27.1	183	266	7.5	183
	7	58	54	0	112	30.5	312	37.7	112	279	8.7	112
	8	4	3	0	7	1.9	359	61.0	7	290	9.5	7
	9	9	1	0	10	2.7	403	47.5	10	297	10.7	10
	10	11	10	0	21	5.7	442	48.3	21	307	9.8	21
	11	5	3	0	8	2.2	469	34.2	8	312	6.9	8
	12	1	2	0	3	0.8	514	25.1	3	320	6.7	3
	13	4	3	0	7	1.9	513	22.6	7	323	6.3	7
	14	1	3	0	4	1.1	549	25.4	4	328	6.9	4
	15	2	0	0	2	0.5	579	81.3	2	328	3.5	2
	16	0	1	0	1	0.3	612		1	342		1
	17											
Sample Total		212	155	0	367	100.0	310	81.3	367	277	18.7	367
26 April- 7 May	4	2	2	0	4	0.1	171	42.7	4	236	13.2	4
	5	45	22	0	67	1.1	225	23.2	67	252	7.4	67
	6	1,145	988	0	2,133	36.4	271	30.3	2,133	266	8.3	2,133
	7	780	725	0	1,505	25.7	319	40.2	1,504	279	9.0	1,505
	8	143	102	0	245	4.2	369	48.0	245	290	7.4	245
	9	204	139	0	343	5.9	426	47.3	343	301	8.2	343
	10	313	289	0	602	10.3	461	47.1	602	309	8.1	602
	11	160	120	0	280	4.8	485	51.5	280	314	9.0	280
	12	146	128	0	274	4.7	502	58.6	274	321	38.2	274
	13	91	92	0	183	3.1	522	56.0	183	322	7.9	183
	14	47	43	0	90	1.5	523	59.0	90	324	9.7	90
	15	45	44	0	89	1.5	546	65.0	89	325	8.9	89
	16	20	17	0	37	0.6	542	60.0	37	329	7.3	37
	17	2	3	0	5	0.1	548	74.7	5	327	10.9	5
All Samples Combined Sex Composition		3,143 53.7	2,714 46.3	0	5,857	100.0	354	101.3	5,856	285	24.0	5,857
Unaged Sex Composition		306 47.1	344 52.9	0	650	11.1	387	102.7	650	293	22.7	650

Appendix B.5. Age, sex and size composition of Pacific herring caught by commercial gillnet, Kulukak Section, 25 April - 6 May 2003.

Sample Dates	Age	Sex (number)			Total	Percent of Total	Weight			Length		
		Male	Female	Unknown			Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
25-Apr	4											
	5											
	6	3	0	0	3	2.4	310	21.1	3	278	2.0	3
	7	8	15	0	23	18.4	360	30.7	23	288	6.9	23
	8	7	13	0	20	16.0	376	23.0	20	294	6.5	20
	9	10	5	0	15	12.0	408	44.4	15	300	7.2	15
	10	22	10	0	32	25.6	451	39.9	32	310	9.0	32
	11	6	7	0	13	10.4	477	35.4	13	318	6.9	13
	12	8	3	0	11	8.8	471	35.8	11	318	7.3	11
	13	2	2	0	4	3.2	489	30.6	4	322	6.4	4
	14	0	1	0	1	0.8	509		1	320		1
	15	0	2	0	2	1.6	528	20.5	2	328	5.7	2
	16	1	0	0	1	0.8	485		1	331		1
	17											
Sample Total		67	58	0	125	100.0	421	60.6	125	304	14.5	125
26-Apr	4											
	5											
	6	0	5	0	5	4.0	316	20.0	5	273	4.1	5
	7	22	30	0	52	41.6	350	31.2	52	287	7.8	52
	8	5	7	0	12	9.6	387	17.5	12	295	5.3	12
	9	6	10	0	16	12.8	429	39.7	16	302	6.6	16
	10	11	9	0	20	16.0	438	28.9	20	307	6.5	20
	11	4	2	0	6	4.8	447	26.8	6	316	7.1	6
	12	2	2	0	4	3.2	526	42.9	4	327	7.6	4
	13	3	2	0	5	4.0	511	18.2	5	325	5.6	5
	14	2	1	0	3	2.4	490	16.5	3	322	10.1	3
	15	1	0	0	1	0.8	454		1	325		1
	16	0	1	0	1	0.8	556		1	337		1
	17											
Sample Total		56	69	0	125	100.0	399	64.0	125	298	15.6	125
27-Apr	4											
	5											
	6	2	3	0	5	4.0	299	22.2	5	274	7.7	5
	7	14	24	0	38	30.6	351	30.4	38	287	8.5	38
	8	7	4	0	11	8.9	376	35.9	11	291	7.0	11
	9	16	7	0	23	18.5	438	37.9	23	305	6.1	23
	10	12	7	0	19	15.3	465	43.4	19	310	9.3	19
	11	11	6	0	17	13.7	462	36.5	17	316	4.9	17
	12	3	2	0	5	4.0	514	40.3	5	325	12.4	5
	13	0	4	0	4	3.2	480	34.4	4	319	6.7	4
	14	1	0	0	1	0.8	524		1	320		1
	15	0	1	0	1	0.8	487		1	316		1
	16											
	17											
Sample Total		66	58	0	124	100.0	413	67.8	124	301	15.5	124

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Appendix B.5. (page 2 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
28-Apr	4											
	5	2	1	0	3	2.2	239	44.1	3	253	6.2	3
	6	10	20	0	30	22.2	282	32.0	30	265	7.4	30
	7	19	30	0	49	36.3	342	35.5	49	282	7.3	49
	8	2	4	0	6	4.4	373	34.1	6	290	9.4	6
	9	3	6	0	9	6.7	446	35.5	9	305	6.6	9
	10	13	9	0	22	16.3	448	34.0	22	308	6.4	22
	11	3	0	0	3	2.2	447	40.1	3	310	2.3	3
	12	3	3	0	6	4.4	512	20.7	6	315	6.4	6
	13	2	4	0	6	4.4	555	64.9	6	324	3.8	6
	14	0	1	0	1	0.7	587		1	333		1
	15											
	16											
	17											
Sample Total		57	78	0	135	100.0	373	88.9	135	288	20.1	135
29-Apr	4											
	5											
	6	1	11	0	12	9.7	299	25.8	12	267	9.2	12
	7	14	28	0	42	33.9	342	38.0	42	281	7.9	42
	8	6	9	0	15	12.1	356	33.9	15	286	6.9	15
	9	9	9	0	18	14.5	423	22.9	18	298	6.0	18
	10	17	7	0	24	19.4	449	43.5	24	306	6.2	24
	11	2	6	0	8	6.5	485	57.3	8	312	8.9	8
	12	2	0	0	2	1.6	417	0.7	2	319	8.5	2
	13	1	1	0	2	1.6	500	66.5	2	318	6.4	2
	14											
	15	0	1	0	1	0.8	465		1	312		1
	16											
	17											
Sample Total		52	72	0	124	100.0	386	68.7	124	291	16.0	124
30-Apr	4											
	5											
	6	7	8	0	15	11.3	308	18.2	15	273	6.7	15
	7	22	27	0	49	36.8	349	39.9	49	287	7.9	49
	8	6	12	0	18	13.5	386	40.7	18	295	7.0	18
	9	6	8	0	14	10.5	441	39.3	14	304	7.5	14
	10	12	9	0	21	15.8	456	34.9	21	310	5.8	21
	11	1	4	0	5	3.8	460	63.3	5	318	4.4	5
	12	2	3	0	5	3.8	501	47.0	5	325	5.8	5
	13	3	2	0	5	3.8	528	56.8	5	327	7.6	5
	14	0	1	0	1	0.8	394		1	303		1
	15											
	16											
	17											
Sample Total		59	74	0	133	100.0	393	71.9	133	296	16.2	133

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Appendix B.5. (page 3 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
1-May	4											
	5											
	6	4	7	0	11	9.3	296	25.6	11	272	5.5	11
	7	16	30	0	46	39.0	356	34.1	46	285	7.3	46
	8	4	9	0	13	11.0	381	29.5	13	291	4.5	13
	9	7	3	0	10	8.5	436	39.9	10	300	7.5	10
	10	15	6	0	21	17.8	452	42.8	21	307	8.0	21
	11	4	1	0	5	4.2	465	30.4	5	312	7.6	5
	12	7	1	0	8	6.8	484	79.0	8	319	9.1	8
	13	2	0	0	2	1.7	556	79.2	2	328	14.8	2
	14	1	0	0	1	0.8	553		1	337		1
	15	0	1	0	1	0.8	578		1	338		1
	16											
	17											
Sample Total		60	58	0	118	100.0	397	73.7	118	294	16.5	118
2-May	4											
	5											
	6	11	14	0	25	19.7	308	28.5	25	270	8.9	25
	7	16	25	0	41	32.3	344	31.9	41	282	7.3	41
	8	7	8	0	15	11.8	383	39.3	15	291	5.3	15
	9	5	4	0	9	7.1	411	32.0	9	301	6.6	9
	10	10	10	0	20	15.7	454	47.4	20	304	7.1	20
	11	3	4	0	7	5.5	489	39.7	7	315	3.4	7
	12	3	1	0	4	3.1	464	36.8	4	312	5.4	4
	13	2	1	0	3	2.4	493	47.1	3	318	2.9	3
	14	1	1	0	2	1.6	499	31.8	2	327	2.1	2
	15											
	16	1	0	0	1	0.8	478		1	333		1
	17											
Sample Total		59	68	0	127	100.0	382	71.2	127	290	17.1	127
3-May	4											
	5											
	6	2	11	0	13	10.4	327	24.9	13	275	5.4	13
	7	21	22	0	43	34.4	342	33.9	43	282	8.7	43
	8	7	4	0	11	8.8	388	27.5	11	292	4.4	11
	9	9	8	0	17	13.6	443	55.5	17	300	6.3	17
	10	8	8	0	16	12.8	454	56.8	16	307	8.1	16
	11	1	6	0	7	5.6	518	46.8	7	322	6.6	7
	12	2	8	0	10	8.0	495	46.9	10	319	6.5	10
	13	3	2	0	5	4.0	486	63.8	5	316	7.2	5
	14	0	1	0	1	0.8	562		1	325		1
	15	0	1	0	1	0.8	488		1	316		1
	16	0	1	0	1	0.8	582		1	351		1
	17											
Sample Total		53	72	0	125	100.0	405	79.9	125	296	17.8	125

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## Appendix B.5. (page 4 of 4)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
5-May	4											
	5											
	6	6	12	0	18	15.5	293	23.9	18	272	8.5	18
	7	14	10	0	24	20.7	344	29.5	24	285	6.7	24
	8	6	5	0	11	9.5	360	37.6	11	289	6.2	11
	9	5	10	0	15	12.9	451	42.4	15	303	6.7	15
	10	8	15	0	23	19.8	462	37.3	23	309	6.0	23
	11	3	6	0	9	7.8	492	31.9	9	317	6.5	9
	12	2	4	0	6	5.2	497	23.2	6	322	7.1	6
	13	2	3	0	5	4.3	510	45.2	5	320	9.0	5
	14	1	0	0	1	0.9	521		1	333		1
	15	2	0	0	2	1.7	503	44.5	2	326	0.0	2
	16	0	2	0	2	1.7	568	29.0	2	329	5.7	2
	17											
Sample Total		49	67	0	116	100.0	410	84.7	116	298	18.6	116
6-May	4											
	5											
	6	3	2	0	5	3.9	308	22.0	5	271	9.0	5
	7	7	23	0	30	23.3	362	26.4	30	287	6.5	30
	8	7	5	0	12	9.3	395	27.9	12	294	7.1	12
	9	8	10	0	18	14.0	433	43.5	18	303	7.4	18
	10	13	15	0	28	21.7	469	41.7	28	311	7.8	28
	11	6	7	0	13	10.1	469	45.6	13	314	8.0	13
	12	8	4	0	12	9.3	503	31.6	12	320	7.7	12
	13	0	5	0	5	3.9	531	66.0	5	323	9.6	5
	14	0	3	0	3	2.3	489	9.5	3	327	2.6	3
	15	2	0	0	2	1.6	561	39.6	2	332	2.1	2
	16	1	0	0	1	0.8	510		1	322		1
	17											
Sample Total		55	74	0	129	100.0	434	69.6	129	303	16.0	129
25 April- 6 May	4											
	5	2	1	0	3	0.2	239	44.1	3	253	6.2	3
	6	49	93	0	142	10.3	301	28.6	142	270	8.1	142
	7	173	264	0	437	31.6	349	33.9	437	284	8.0	437
	8	64	80	0	144	10.4	378	33.1	144	292	6.7	144
	9	84	80	0	164	11.9	433	41.2	164	302	6.9	164
	10	141	105	0	246	17.8	455	41.1	246	308	7.5	246
	11	44	49	0	93	6.7	475	43.2	93	316	6.8	93
	12	42	31	0	73	5.3	493	45.4	73	320	8.1	73
	13	20	26	0	46	3.3	514	53.2	46	322	7.4	46
	14	6	9	0	15	1.1	506	45.1	15	325	8.7	15
	15	5	6	0	11	0.8	514	45.3	11	325	8.0	11
	16	3	4	0	7	0.5	535	44.7	7	333	9.4	7
	17											
All Samples Combined Sex Composition		633 45.8	748 54.2	0	1,381	100.0	401	75.0	1,381	296	17.5	1,381
Unaged Sex Composition		78 45.9	92 54.1	0	170	12.3	428	77.9	170	304	17.0	170

Appendix B.6. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Nunavachak Section, 25 April 2003.

Sample Dates	Age	Sex (number)			Total	Percent of Total	Weight			Length		
		Male	Female	Unknown			Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
25-Apr	4											
	5											
	6	5	9	0	14	12.1	252	21.2	14	275	5.9	14
	7	12	10	0	22	19.0	272	38.3	22	283	9.5	22
	8	1	3	0	4	3.4	298	53.5	4	290	10.6	4
	9	1	1	0	2	1.7	399	94.0	2	314	8.5	2
	10	12	16	0	28	24.1	395	34.5	28	313	7.9	28
	11	10	5	0	15	12.9	405	33.6	15	318	7.1	15
	12	4	7	0	11	9.5	416	21.2	11	322	8.0	11
	13	7	1	0	8	6.9	433	6.7	8	326	5.4	8
	14	2	3	0	5	4.3	447	39.2	5	330	5.4	5
	15	5	0	0	5	4.3	459	32.5	5	332	9.6	5
	16	0	1	0	1	0.9	448		1	328		1
	17	1	0	0	1	0.9	458		1	341		1
All Samples Combined		60	56	0	116	100.0	363	78.8	116	306	20.9	116
Sex Composition		51.7	48.3									
Unaged		8	11	0	19	16.4	378	75.9	19	311	16.9	19
Sex Composition		42.1	57.9									

Appendix B.7. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Hagemeister Section, 8 May 2003.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
8-May	4											
	5	1	4	0	5	3.8	231	21.3	5	254	5.3	5
	6	26	16	0	42	32.1	271	26.4	42	266	6.6	42
	7	18	22	0	40	30.5	311	33.2	40	278	8.0	40
	8	4	1	0	5	3.8	368	32.4	5	293	4.9	5
	9	6	3	0	9	6.9	421	51.3	9	297	8.8	9
	10	5	6	0	11	8.4	471	61.1	11	312	9.4	11
	11	2	3	0	5	3.8	469	52.5	5	318	9.8	5
	12	4	2	0	6	4.6	489	60.4	6	316	12.5	6
	13	1	2	0	3	2.3	512	48.2	3	322	4.4	3
	14	1	3	0	4	3.1	562	16.4	4	329	8.9	4
	15											
	16	1	0	0	1	0.8	580		1	332		1
	17											
All Samples Combined		69	62	0	131	100.0	347	98.8	131	284	22.4	131
Sex Composition		52.7	47.3									
Unaged		3	6	0	9	6.9	314	72.6	9	276	15.5	9
Sex Composition		33.3	66.7									

Appendix B.8. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Togiak Section, 29 April 2003.

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
29-Apr	4											
	5	7	0	0	7	6.0	214	17.7	7	253	3.3	7
	6	23	21	0	44	37.6	246	31.4	44	266	7.0	44
	7	31	16	0	47	40.2	280	37.0	47	276	8.0	47
	8	1	1	0	2	1.7	406	22.6	2	302	4.9	2
	9	1	1	0	2	1.7	388	24.0	2	301	0.0	2
	10	3	4	0	7	6.0	449	56.4	7	315	7.1	7
	11	2	0	0	2	1.7	410	74.2	2	312	19.1	2
	12	2	0	0	2	1.7	444	13.4	2	318	7.8	2
	13	1	1	0	2	1.7	389	10.6	2	313	11.3	2
	14	2	0	0	2	1.7	547	102.5	2	331	14.1	2
	15											
	16											
	17											
All Samples Combined		73	44	0	117	100.0	289	79.0	117	277	19.1	117
Sex Composition		62.4	37.6									
Unaged		8	3	0	11	9.4	314	76.5	11	284	15.9	11
Sex Composition		72.7	27.3									

Appendix B.9. Age, sex and size composition of Pacific herring caught by test commercial purse seine, Nunavachak, Hagemeister and Togiak Sections combined, 25 April - 8 May 2003.

Sample Dates	Age	Sex (number)			Total	Percent of Total	Weight			Length		
		Male	Female	Unknown			Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
25-Apr	4											
	5											
	6	5	9	0	14	12.1	252	21.2	14	275	5.9	14
	7	12	10	0	22	19.0	272	38.3	22	283	9.5	22
	8	1	3	0	4	3.4	298	53.5	4	290	10.6	4
	9	1	1	0	2	1.7	399	94.0	2	314	8.5	2
	10	12	16	0	28	24.1	395	34.5	28	313	7.9	28
	11	10	5	0	15	12.9	405	33.6	15	318	7.1	15
	12	4	7	0	11	9.5	416	21.2	11	322	8.0	11
	13	7	1	0	8	6.9	433	6.7	8	326	5.4	8
	14	2	3	0	5	4.3	447	39.2	5	330	5.4	5
	15	5	0	0	5	4.3	459	32.5	5	332	9.6	5
	16	0	1	0	1	0.9	448		1	328		1
	17	1	0	0	1	0.9	458		1	341		1
Sample Total		60	56	0	116	100.0	363	78.8	116	306	20.9	116
29-Apr	4											
	5	7	0	0	7	6.0	214	17.7	7	253	3.3	7
	6	23	21	0	44	37.6	246	31.4	44	266	7.0	44
	7	31	16	0	47	40.2	280	37.0	47	276	8.0	47
	8	1	1	0	2	1.7	406	22.6	2	302	4.9	2
	9	1	1	0	2	1.7	388	24.0	2	301	0.0	2
	10	3	4	0	7	6.0	449	56.4	7	315	7.1	7
	11	2	0	0	2	1.7	410	74.2	2	312	19.1	2
	12	2	0	0	2	1.7	444	13.4	2	318	7.8	2
	13	1	1	0	2	1.7	389	10.6	2	313	11.3	2
	14	2	0	0	2	1.7	547	102.5	2	331	14.1	2
	15											
	16											
	17											
Sample Total		73	44	0	117	100.0	289	79.0	117	277	19.1	117
8-May	4											
	5	1	4	0	5	3.8	231	21.3	5	254	5.3	5
	6	26	16	0	42	32.1	271	26.4	42	266	6.6	42
	7	18	22	0	40	30.5	311	33.2	40	278	8.0	40
	8	4	1	0	5	3.8	368	32.4	5	293	4.9	5
	9	6	3	0	9	6.9	421	51.3	9	297	8.8	9
	10	5	6	0	11	8.4	471	61.1	11	312	9.4	11
	11	2	3	0	5	3.8	469	52.5	5	318	9.8	5
	12	4	2	0	6	4.6	489	60.4	6	316	12.5	6
	13	1	2	0	3	2.3	512	48.2	3	322	4.4	3
	14	1	3	0	4	3.1	562	16.4	4	329	8.9	4
	15											
	16	1	0	0	1	0.8	580		1	332		1
	17											
Sample Total		69	62	0	131	100.0	347	98.8	131	284	22.4	131

-Continued-

Appendix B.9. (page 2 of 2)

Sample Dates	Age	Sex (number)				Percent of Total	Weight			Length		
		Male	Female	Unknown	Total		Mean (g)	SD	Number Weighed	Mean (mm)	SD	Number Measured
25 April- 8 May	4											
	5	8	4	0	12	3.3	221	20.4	12	254	4.1	12
	6	54	46	0	100	27.5	257	30.2	100	267	7.4	100
	7	61	48	0	109	29.9	290	39.2	109	278	8.7	109
	8	6	5	0	11	3.0	350	56.5	11	294	7.9	11
	9	8	5	0	13	3.6	412	52.2	13	300	9.9	13
	10	20	26	0	46	12.6	421	55.8	46	313	8.0	46
	11	14	8	0	22	6.0	420	47.6	22	317	8.5	22
	12	10	9	0	19	5.2	442	49.4	19	320	9.5	19
	13	9	4	0	13	3.6	444	46.5	13	323	7.4	13
	14	5	6	0	11	3.0	507	71.4	11	330	7.5	11
	15	5	0	0	5	1.4	459	32.5	5	332	9.6	5
	16	1	1	0	2	0.5	514	93.3	2	330	2.8	2
	17	1	0	0	1	0.3	458		1	341		1
All Samples Combined		202	162	0	364	100.0	333	91.9	364	289	24.2	364
Sex Composition		55.5	44.5									
Unaged		19	20	0	39	10.7	345	80.2	39	295	22.5	39
Sex Composition		48.7	51.3									

## Appendix C.1. 2003 Togiak Herring Forecast

### Togiak Herring Forecast

The 2003 Togiak herring forecast and harvest allocation is listed below for the Togiak District sac roe fishery and the Dutch Harbor food and bait fishery, given a maximum 20% exploitation rate of the projected run biomass:

*Harvest Allocation of the 2003 Forecasted Pacific  
Herring Run Biomass, Togiak District, Bristol Bay*

	Biomass (Short Tons)	Harvest (Short Tons)
Forecasted Biomass for 2003	126,213	
Exploitation @ maximum 20% for Total Allowable Harvest		25,243
Togiak Spawn-on-Kelp Fishery (Fixed Allocation)		1,500
Remaining Allowable Harvest		23,743
Dutch Harbor Food/Bait Allocation (7.0% of the remaining allocation)		442 <sup>a</sup>
Remaining Allowable Harvest for Togiak District Sac Roe Fishery:		22,081
Purse Seine Allocation 70.0%		15,457
Gill Net Allocation 30.0%		6,624

<sup>a</sup> In accordance with the Dutch Harbor food and bait fishery allocation plan (5 AAC 27.655(b)), the 2002 overharvest of 1,220 tons was subtracted from the 2003 allocation of 1,662 tons leaving a remaining allocation of 442 tons.

Age-structured analysis (ASA) has been used since 1993 to forecast the Togiak herring population. This methodology estimates population abundance using age composition data in conjunction with biomass estimates selected from the best aerial survey years.

The forecasted herring biomass for the Togiak District in 2003 is 126,213 tons. Returns from the 1996, and 1997 year classes (ages-7, and-6, respectively) are expected to dominate with 52% of the biomass and 55% of the abundance in numbers of fish (Figure 1). Age-10 herring from year class 1993 are expected to follow in magnitude with 13% of the biomass and 10% of the abundance. A time series moving average model of 1 was used to forecast the age-4 abundance. The forecasted return of age-4 and -5 herring are uncertain because of the limited sample size of age-4 fish, and the fact that new recruits are not confirmed until they.



return as age-5 herring. The forecasted average weight of the harvest biomass is 291 g. Average weight should start to increase in the 2004 season when the 1996 year class fully recruits as age-8 herring.

The total allowable harvest on the Togiak herring stock for 2003, as specified in 5 AAC 27.865 (b)(7) is 25,243 tons. Based on the 2002 forecasted Togiak District herring biomass of 120,196 tons, the 2002 Dutch Harbor food and bait fishery allocation was 1,578 tons. The Dutch Harbor fishery resulted in a total harvest of 2,798 tons in 2002. In accordance with the Dutch Harbor food and bait fishery allocation plan (5 AAC 27.655(b)), the amount harvested over the allocation in 2002 (1,220 tons) shall be subtracted from the 2003 allocation of 1,662 tons. This leaves the remaining Dutch Harbor food and bait fishery allocation at 442 tons. In accordance with the Bristol Bay Management Plan (5 AAC 27.865), the 2003 harvest allocation is 1,500 tons to the Togiak District spawn-on-kelp fishery; 442 tons to the Dutch Harbor food and bait fishery; and 22,081 tons to the Togiak District sac roe fishery.

In 2002, inclement weather conditions and poor visibility throughout the herring fishery prevented an accurate aerial assessment of the total run biomass. No aerial surveys were conducted between May 4 and May 10. Therefore, inseason management was based on the preseason forecast of 120,196 tons. Herring were first reported in the district on May 1 by industry representatives. On May 2, staff confirmed the presence of approximately 10,000 tons of herring in areas of the upper Nushagak Peninsula, Kulukak, Ungalikthluk and Togiak Bays. The threshold biomass estimate of 35,000 tons was observed the following day on May 3. The peak biomass estimate of 45,167 tons was observed on May 11. The last survey conducted on June 4 observed an estimated 2,892 tons of herring still on the grounds.

Samples from non-selective gear (commercial purse seine and test purse seine) were used to assess the age composition of the run biomass. Commercial purse seine catch and test fish samples ranged from age-4 to age-18. Age-6 and age-5 herring were the most prevalent and represented 53% of the harvest biomass and 66% of the abundance. Age-9 herring followed with 15% of the biomass and 10% of the abundance.

A change in age composition from older to younger herring was observed in the Nunavachak Section commercial purse seine samples as early as May 5. An early shift to younger herring when only two days had elapsed since the start of the commercial fishery suggests that herring were present on grounds prior to the first observation on May 1. A period of inclement weather precluded department staff surveying the district between April 26 and May 1. This could potentially bias the samples to the younger age classes.

Abundance of the Togiak herring spawning population has been monitored since the late 1970's, concurrent with the development of the sac-roë fishery. Peak abundance was observed during the 1982 and 1983 seasons with recruitment of the large age-5 and age-6 year classes from brood years 1977 and 1978 into the spawning biomass. The 1977 and 1978 year classes dwarfed the magnitude of subsequent year classes. The last modest recruitment events were evident in the 1987 and 1988 year classes. Current data suggests that we are seeing moderately strong recruitment from the 1996 and 1997 year classes and that the Togiak herring population is stable.

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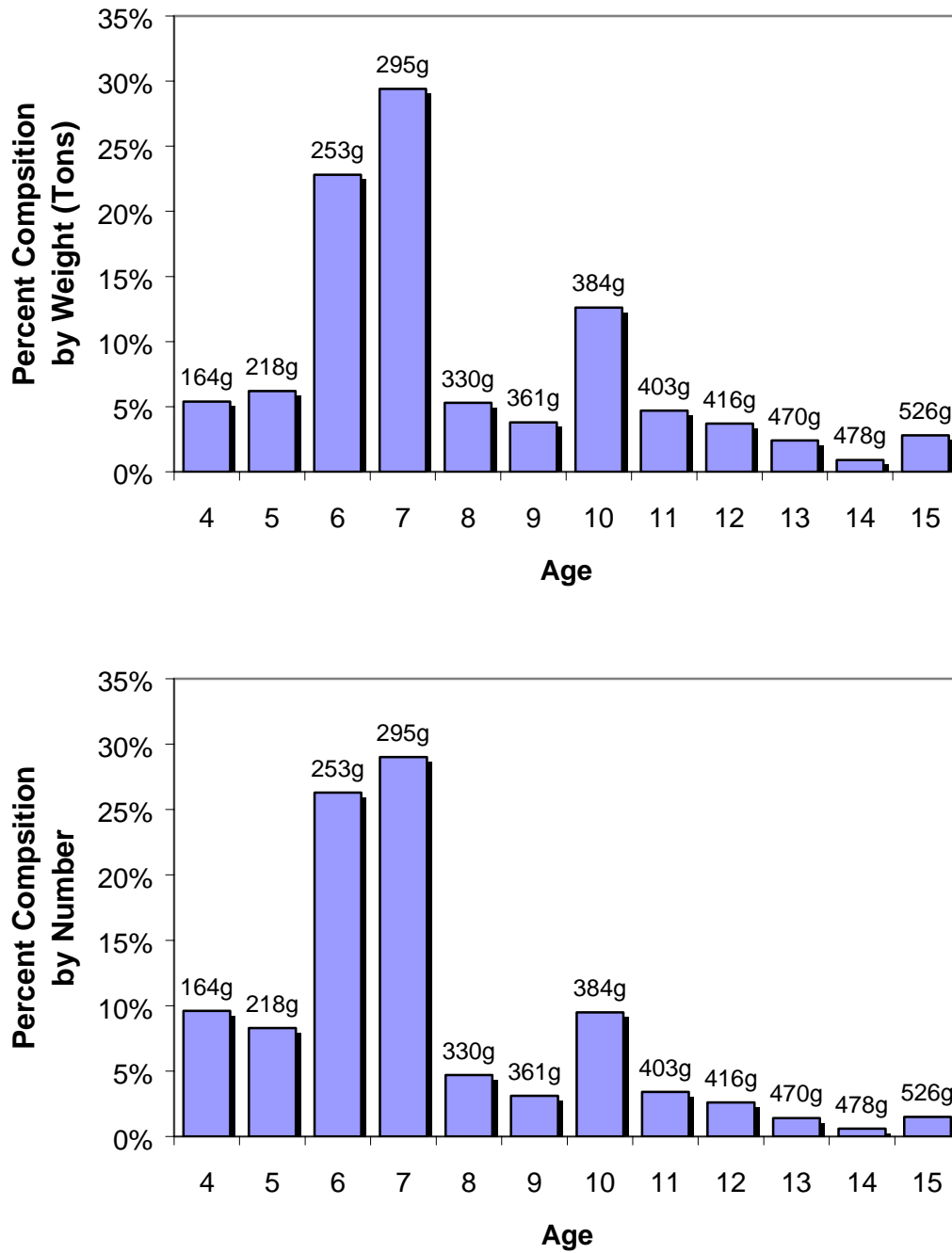


Figure 1. Forecasted age composition by weight (top) and number (bottom) for the 2003 Togiak herring return. Forecasted average weight (grams) by age is also presented.

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